

THE PLANTERS' CHRONICLE.

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JULY 6, 1912.

[PRICE AS. 8.

THE U. P. A. S. I.

(INCORPORATED.)

The International Rubber Exhibition, 1911.

Contributions to the Association's Fund in connection with the above Exhibition proved to be in excess of requirements. After meeting all expenses a surplus remained that permitted of a refund being made to all contributors in the proportion of 2 annas $4\frac{1}{2}$ pies per rupee subscribed.

The following payments have, therefore, been made:—

To the Government of Madras	...	...	...	Rs.	445	5	0
" " " Travancore	...	...	...	"	74	3	6
" " " Cochin	...	...	...	"	44	8	6
" Malabar Coast Planters' Association	...	...	...	"	332	8	0
" Shevaroy " "	...	...	...	"	74	13	0
" South Mysore " "	...	...	...	"	6	15	7
" Kanan Devan " "	...	...	...	"	3	11	4
" South Travancore " "	...	...	...	"	84	15	7
					Rs.	1,067	0 6

The Exhibition account has been closed.

Cash Balances in London.

Under date June 17, 1912, the Secretary, Karachi Chamber of Commerce, wrote to the U. P. A. S. I.:—

"I am directed by my Committee to invite your attention to the attached note of the 10th instant (Circular No. 1-1912) on the subject of the present excessive Cash Balances held in London by the Secretary of State for India.

"These figures are quite separate from and exclusive of the balance held in London on account of The Gold Standard Reserve—which, my Committee believe, amounts to nearly £19,000,000.

"The retention of these colossal balances in London appears to my Committee to be contrary to the best interests of India. At the present time, when more capital is urgently needed for the development of India's railways, canals and other public works, and when for the attainment of these ends, this country could well afford to pay four or even four and half per cent. for capital, my Committee are unable to see the advantage of withdrawing many millions sterling from India for investment in London in securities bringing in a much lower return and in most of which the peoples, trades and industries of this country are in no way concerned.

"I am to enquire if your Chamber can see its way to lend its support to a joint protest to Government against excessive cash balances being retained in London by the Secretary of State."

[INCLOSURE.]

Circular dated June 10, 1912.

"The *cash balance* held in London by the India Office on behalf of the Government of India has increased in the last five years from four-and-a-half millions sterling to close upon eighteen millions sterling. The exact figures are as under :—

On 31st Dec. 1907	£ 4,607,266	(Exclusive of the Gold Standard Reserve).
" 1908	7,983,898	" " "
" 1909	12,799,090	" " "
" 1910	16,697,245	" " "
" 1911	15,292,638	" " "
On 8th Mar. 1912	17,953,995	" " "

In the absence of any legitimate need for this colossal cash balance, the Secretary of State has lent the money to various financiers and banks in the City of London with and without security at rates approximating 2½ per cent. per annum.

"On the 10th May 1912, Mr. G. A. Touche, M. P. asked the Secretary of State for India to whom the money had been lent. Mr. Montagu's reply was that £6,915,000 had been deposited with seven (London) banks without security; £10,100,000 had been lent to approved borrowers; and the balance was held on current account with the Bank of England. . . .
"The Secretary of State does not consider it desirable to publish the names of the approved borrowers.

"The unnecessary withdrawal of nearly £18,000,000 from India where capital is badly needed, and where bankers and financiers would probably be prepared to pay 4 or 5 per cent. for it, and its loan at half these rates of interest secretly to London financial companies who are probably not directly concerned in the development of Indian commerce and industries, appears to be an irregularity that calls for the strongest possible protest. It is suggested that all Chambers of Commerce in India be asked if they are prepared to make a united protest against these methods of India Office finance.

"In the mean time it may be noted that the Secretary of State notwithstanding his cash balance of over seventeen and three quarters millions sterling, has recently *borrowed* £3,000,000 in London (at a heavy discount) on behalf of the Government of India."

Indo-European Trans-Persian Railway.

Under date June 18, 1912, the Secretary, Karachi Chamber of Commerce wrote to the U. P. A. S. I. :—

"I am directed to invite your attention to the enclosed Circular No. 2-1912 on the subject of the representations made by this Chamber in support of an early construction of the Indo-European Trans-Persian Railway.

"In view of the fact that the completion of this railway will not only afford rapid and cheap means of communication and transport between the great industrial centres of India and the markets of Persia, but will also bring the United Kingdom and India within a week of each other, thus immensely facilitating the carriage of the mails, the development of passenger traffic and the progress of the whole country, my Committee hope

that your Association will be able to give this great trunk railway project its hearty support."

[INCLOSURE.]

Circular dated June 11, 1912, giving the following extracts from representations made by the Committee of the Karachi Chamber of Commerce:

Extract No. 1 from the Address presented to His Excellency the Viceroy at Government House, Karachi, on the 12th April 1911:—

. . . . The question of linking India with Europe by means of a Trans-Persian Railway is now engaging the attention of European financiers. The Chamber notice that the proposal has taken the form of connecting the Russian Railways of the Caucasus with the Indian Railway system at Nushki. We would respectfully submit for Your Excellency's consideration that the best route for such a line of communication would be by way of Bam, Southern Baluchistan (*i.e.*, Panjgur) and Karachi. This route would have the advantage of tapping fertile country and, moreover, would find its terminus in a rising commercial seaport.

Extract No. 2 from Lord Hardinge's reply to the above address:—

. . . . "It is impossible to say at present whether or when the proposed Trans-Persian Line will become a realisable project. The present situation in the South of Persia is not one which offers much encouragement to capitalists to finance such schemes, but the question of the construction of this line has been under the serious consideration of the Government of India; and the claims of Karachi as a terminus of a line passing through Southern Baluchistan have not been lost sight of"

Extract No. 3 from the Chamber's letter No. 44 of the 23rd January 1912 to the Secretary to the Government of India, Foreign Department, Calcutta:—

. . . . I am directed to inform you that my Committee have had under consideration the question of the locality of the break of gauge in the proposed Trans-Persian Railway.

It has been noticed that statements have appeared in the English and Russian Press and have been telegraphed to India to the effect that the seaboard of the Persian Gulf at Charbar or Bunder Abbas would be an appropriate point at which to locate a break of gauge in the proposed trunk Railway from the Caucasus to Karachi.

My Committee dissent from this view. They are strongly of opinion that the interests of British trade demand that the break of gauge (if such be unavoidable) should not be allowed to occur at any point south of the Russian sphere of influence as defined by a line drawn at Kasr-i-shirin to the north-west corner of Afghanistan through Ispahan and Yezd.

I am to beg that you will be so good as to transmit this view to the Supreme Government.

Extract No. 4.—Letter dated Calcutta, 6th February 1912, from the Deputy Secretary to the Government of India in the Foreign Department, to the Secretary to the Karachi Chamber of Commerce.

I am directed to acknowledge the receipt of your letter No. 44, dated the 23rd January 1912 regarding the locality of the break of gauge in the proposed Trans-Persian Railway.

2. Your communication has been forwarded as desired to His Majesty's Government.

Extract No 5.—Letter No. 338 of 28th May 1912 from the Chairman, Karachi Chamber of Commerce, to the Secretary to the Government of India, in the Foreign Department, Simla.

With reference to this Chamber's letter of 23rd January, I have the honour to inform you that the Committee of this Chamber have had under consideration the question of the route through Southern Persia of the proposed Trans-Persian Railway to India.

The Committee are of opinion that it will be to the best interests of both India and Great Britain if the line be carried from Karachi to Teheran by the shortest and most direct route possible. Such a route would not only pass through the most populous towns and wealthy portions of southern Baluchistan and Persia—namely Panjgur, Bam, Kerman, Yezd and probably Ispahan—but by reducing the length of the line, cost of transport, and the time occupied in transit, it would encourage to the utmost that through traffic upon which the success of the line will largely depend.

If for political reasons it be deemed necessary to carry a portion of the southern section of the line along the coast of Baluchistan, then this Chamber would urge that the coast section be kept to the smallest possible length. The port and town of Pasni would appear to be a suitable point at which to leave the coast and so serve a comparatively fertile portion of Makran. If for engineering reasons, Pasni be found unsuitable, then some point a little westward of Pasni might be selected. But this Chamber would urge most strongly that the line be carried inland before it passes out of British territory. Jewni on the eastern shore of the Bay of Gwettar is, in the opinion of this Chamber, the uttermost point to which the line should be carried out of its direct route from Karachi to Bam, Kerman and Yezd.

It follows from the above that this Chamber is altogether opposed to the Trans-Persian Railway being carried along the coast from Karachi as far as Bunder Abbas. Indeed, my Committee can see no reason whatever for going to the expense of serving Bunder Abbas at all by a Railway. From Pasni or Gwettar Bay, Kerman could be reached by mail in less than a day, and from Karachi, in well under two days. In these circumstances, and looking to the absence of natural resources at Bunder Abbas as a Port, this Chamber can see no grounds whatever for carrying the Trans-Persian Railway to Bunder Abbas.

In conclusion this Chamber would press upon the attention of Government the desirability of a very early construction of the Trans-Persian Railway as the most practical, the least expensive, and most certain way of solving the problem of establishing peace, security and better Government in Southern Persia. Railway and irrigation works have had a marked effect in quieting and reforming the more turbulent tribes and individuals on certain parts of the north-western frontiers of India. And my Committee urge that similar results would probably follow the construction of a great trunk line of Railway through Southern Persia. Not only would the expenditure of money in Persia have a certain settling effect on the nomads and turbulent tribes who now derive a livelihood from extortion and robbery, but the creation of a line of railway would give to the Persian authorities that means of easy and rapid communication and transport without which the suppression of disorder in a country like Persia would be a matter of extreme difficulty for any Government, however strong.

All which being so, the Chamber beg that the Government of India will be so good as to transmit these views to the Secretary of State for India; and my Committee trust the Government of India will be able to see their way to accord to this Chamber's representation their most valued support.

DISTRICT PLANTERS' ASSOCIATIONS.**Central Travancore Planters' Association.**

Minutes of an Extraordinary General Meeting of the above Association which was held at Glenmary Bungalow on Wednesday, 5th June, 1912.

PRESENT.—Messrs. F. Bissett (Chairman), F. W. Winterbotham J. H. Ellis, W. G. Haslam, A. R. St. George, W. A. J. Milner, J. S. Wilkie, R. P. Roissier, H. C. Wastaway, J. A. Richardson, F. C. Forbes and MacKenzie.

The notice calling the meeting was then read.

Election of Members on Committee.—Mr. McArthur having resigned his place on Committee and Mr. R. E. Haslam having also resigned as Honorary Secretary, the Chairman ordered election of members to fill these vacancies and the result was as follows—

Committee	... Mr. H. C. Westaway.
Honorary Secretary	... Mr. R. P. Roissier.

Correspondence.—Read letter from the Chief Secretary to Government No. 1894 of 24/4/12 and it was resolved: "That the Honorary Secretary do write to Chief Secretary to Government asking that vehicles passing the toll twice in 24 hours be exempted from a charge on the return journey."

Read letter from Honorary Secretary, Mundakayam Rubber Planters' Association of 7/2/12 and it was resolved: "That the Honorary Secretary do write to Honorary Secretary, Mundakayam Planters' Association and send a copy of our labour rules and inform that Association that we do not see any reason to change them at present."

Read letter from Secretary, U. P. A. S. I., No. 16/12 26/4/12. Read letter from Mr. Ormerod, Secretary, U.P.A.S.I., *re* his resignation of 2/5/12. Read letters from Honorary Secretary, Kanan Devan Planters' Association of 18/5/12 and 21/5/12. Read letter from Secretary, U. P. A. S. I., No. 18/12 of 20/5/12 annual meeting of the U.P.A.S.I. and enclosing preliminary draft of Agenda paper and asking if there are any subjects to be added and it was resolved: "That Tobacco Importation Duty into Travancore be added." Also "That Honorary Secretary be instructed to write to the British Resident asking if Tobacco which has already paid duty into British India is liable to duty in Travancore." Read letter from Secretary, U. P. A. S. I. of 25/5/12. Read letters from various estates in district giving their cart hire rates and Honorary Secretary was instructed to make a copy. Read letter from Sub-Division Officer, Peermade, 151 of 18/5/12. Read letter from Honorary Secretary, Kanan Devan Planters' Association of 8/4/12.

District Roads.—Read letters from Sub-Division Officer No. 150 of 18/5/12 and No. 151 of 18/5/12.

Mannan's Creek Bridge.—Read letter from Chief Secretary to Government No. 2209 of 9/5/12 and the Honorary Secretary was instructed to send a copy to the Superintendents of Estates interested.

Resolution by Mr. J. A. Richardson.—Mr. Richardson proposed "That in future all district rates for Estate labour, Factory, Cart hires, Carpentry and Masonry be revised once a year and that a list of rates be drawn up and brought before the next General Meeting of the Association for confirmation and then circulated amongst the members." Seconded by Mr. T. C. Forbers. Carried unanimously. With a vote of thanks to the chair the Meeting terminated.

(Signed) REGINALD P. ROISSIER,
Honorary Secretary.

Anamalai Planters' Association.

Proceedings of a half-yearly General Meeting of the Anamalai Planters' Association, held at the Puthutottam Bungalow on Monday, the 17th June, 1912.

PRESENT.—Messrs. G. A. Marsh (Chairman), B. A. Marden, Norman Grey, C. Howland, H. W. deSalis, J. H. Ireland Jones, J. O. K. Walsh, E. N. House and J. Hatton Robinson (Honorary Secretary).
By Proxy.—Mr. G. L. Duncan. *Visitors.*—Mr. M. E. Platt, P. W. D., and Mr. H. M. Foulton (Messrs. Walker, Sons & Co., Colombo).

1. *Delegates to the U. P. A. S. I. Meeting.*—Mr. Marden proposed and Mr. Howland seconded: "That Messrs. Marsh and Robinson be asked to represent the Association at the meeting." These gentlemen consented to attend the meeting, if they could possibly do so. It was further decided that should Messrs. Marsh and Robinson be unable to attend the meeting, Mr. C. H. Brock be very kindly asked to represent the Association.

2. *Minor Forest Produce.*—Mr. Duncan's views on this subject and letters from the District Forest Officer were read to the meeting, and after some discussion the matter was left to the Honorary Secretary of the Minor Forest Produce to deal with.

3. *Hospital and Township Sites.*—The Collector of Coimbatore's letter No. 585 of the 6th June 1912, was read. It showed that Government was adverse to the Hospital being built on the originally selected site, and suggested a site on the main road between the Valparai and Monica Estates. The selection of a suitable site is a very "sore" subject and has been before the Association many times lately, and although everybody present voted for Mr. Marsh's proposal it cannot be said that it was altogether popular, still, nobody else proposed an alternative site except Mr. Robinson, who mentioned that he considered the high land nearby the 29th milestone an excellent situation for the Hospital and future Township, but this possible site was not discussed, and as Government had called for an early reply, the matter could not be left over. Mr. Robinson then seconded Mr. Marsh's proposition, which was put to the meeting and carried unanimously. Proposed by Mr. Marsh and seconded by Mr. Robinson: "That the meeting was of opinion that it was best to fall in with the lines suggested by the Collector, and that they agreed to the Hospital being built on the site selected by him. Further, that they were entirely at one with the Collector's suggestion that the land between the two rivers, recently provisionally granted to Mr. Simcock's Company, be retained by Government with a view to the possible needs of the future, and, that should this land be ever thrown open Mr. Simcock's Company have first claim to it."

4. *Hospital Affairs.*—As Mr. Duncan, who everybody regretted was unable to attend the meeting, owing to ill-health, was mostly interested in this item, it was resolved that it should stand over until he could personally attend a meeting.

5. *Access to New Estates.*—Owing to several representatives being away, it was resolved that this matter also stand over until another meeting.

6. *Issuing of Warrants.*—The Honorary Secretary was instructed to write to the Collector and ask why Mr. G. L. Duncan, whose name had been sent up in January last, had not already been gazetted as a Special Honorary Magistrate?

7. *Postal Affairs.*—The Honorary Secretary was instructed to again remind the Post Master General of his letter of the 2nd March 1912, enclosing a copy of that letter, also to protest against the conduct of the present Post-master, and to press for the immediate construction of a new Post Office.

8. *Cooly Wages.*—Owing to the enhanced rates of labour prevailing in the District many maistries were now trying to get pay for many of their coolies that were not in the least eligible for such payments. It was proposed by Mr. Robinson and seconded by Mr. Ireland Jones: "That the Managers and Superintendents and Writers in charge of Estates do personally fix the proper rates for all their labour, and further that coolies who are quite well and who do not work for 6 days every week, shall have their 'Rice Orders' reduced at the rate of 2 annas for each day that they do not work."—Carried unanimously.

9. *Roads.*—It was pointed out that although the present time of year was most suitable for the consolidation of metal practically nothing was being done on the roads in the District, the 3 branch bandy roads, in particular, being in a most appallingly disgraceful state, that from the 27th to 32nd milestone being in the worst state of the three, but all of them being almost impossible for wheeled traffic. The Honorary Secretary was requested to write to the Assistant Engineer, Coimbatore Sub-Division, and to send a copy of his letter to the Superintending Engineer.

10. *U. P. A. S. I. Secretaryship.*—On hearing of the resignation of the Secretary, the Chairman and Honorary Secretary of this Association sent a letter to Mr. Abbott sympathising with him for the temporary inconvenience he would be subjected to; the letter was read to the meeting and endorsed by it. Mr. Abbott's letter of the 11th instant to the Vice-Chairman and Councillors, U. P. A. S. I., was read and the contents upheld by the meeting.

Mr. Marden proposed and Mr. Grey seconded a hearty vote of thanks to the Chairman, Mr. Marsh, whose hospitality was very much appreciated by the meeting.

The Honorary Secretary desires to thank all the resident members of the Association for their very generous subscriptions to the *Titanic Fund*. The List amounts to Rs.162-8-0, and £10 16s. 8d. has been remitted home to the MANSION HOUSE FUND—opened by the Lord Mayor for the relief of distress caused by the loss of the *Titanic*.

(Signed) J. HATTON ROBINSON,

Hony. Secy. & Treasurer.

Coffee growers in Porto Rico are preparing to make another attempt at enlarging and improving their markets in the United States. Porto Rico produces from 30,000,000 to 45,000,000 pounds of coffee a year, but has never succeeded in securing a good market in the United States, and recent years have been less and less. Most of the coffee from Porto Rico, which went to Spain under the Spanish régime, still goes either to that country or to Vienna. In those markets it brings a better price than in the United States, where it sells in competition with Santos, whose market quotation is often from 2 to 3 cents a pound below the Porto Rican product. Earlier efforts at making a market by popularizing the island's coffee were for various reasons unsatisfactory. The new plan proposes a roasting plant in New York.—*Spice Mill*.

CORRESPONDENCE.

The Soil.

Sir,—I am enclosing you a cutting from the *Evening Standard* on a subject that may interest many planters and which I think you might publish in the *Chronicle* to see what comments can be drawn. In these days when this so-called Stump rot and fungus diseases are showing up in increasing patches year after year, and Science has instilled into us that it is madness to move our soil where there is a natural mulch covering the ground, (though we have thousands of rotting shade roots and stumps all over our Estates) I question very much if we have not been misled, and that we have been on the wrong tack, most of us now for many years, and had we never given up the old method of cultivation with forks, we might have less to complain of in the way of these diseased patches). Referring to the cutting where it says "His contention is that soil does not need enriching, that all soils, the richest as well as the poorest, contain sufficient fertilising material to insure good crops"—one certainly finds it impossible to believe such a statement; but the rest of the article may be worthy of our attentions.

Madapur, 20th June, 1912.

Yours faithfully,

"STUMPED."

[INCLOSURE.]

POISONED GROUND.

American New Theory of Gardening.

All our ideas as to action and interaction of soil and plant are shaken by the theory put forward by Mr. Milton Withney of the American Department of Agriculture.

Arguing from what takes place in the animal creation, where the system automatically gets rid of matter for which it has no further use, such matter being by that time of a poisonous nature; he argues that the roots of plants get rid of noxious gases, which gradually poison the soil all round the roots. The effect of stirring the soil is to liberate these gases and bring them to the surface. The transplantation of the tree or shrub or plant has, of course, the same effect.

There never has been any doubt as to the value of transplanting flowers and shrubs, especially roses, but it was always supposed that the benefit arose from their removal out of an exhausted soil to one that contained the necessary food. According to Mr. Withney, that is a mistake, and he backs up his argument by an experiment which is certainly a telling one. He sowed some wheat in a pot. When it had grown, ripened, and been harvested, he sowed some more wheat in the same pot, adding some fertilisers. Theoretically, the second crop, having received this additional food, should have equalled the first; but it did not, says "*Le Journal*," in describing the experiments, and the third crop was still more inferior. Mr. Withney then took this pot of apparently exhausted soil and added to it an antiseptic, pyrogallol, which has no feeding value whatever. Marvellous to relate, the next crop of wheat—the fourth—was as good as the first, and the fifth and sixth were equally good.

THE DISEASE OF A SOIL.

His contention is that soil does not need enriching, that all soils, the richest as well as the poorest, contain sufficient fertilising materials to ensure good crops. What they want is to be cured of the diseases bequeathed by previous crops; the poisons must be counteracted. Natural and artificial

manures do this to some extent unsuspected by the user of them, but a much more certain and economic method of dealing with the malady is to attack it straight away with a medicine.

Mr. Withney asks us to observe the analagous procedure of nitrifying bacteria which gradually create an environment fatal to themselves. So, too, alcoholic ferments are asphyxiated, as it were, by the results of their own energies, when they have created an environment containing 15 per cent. of alcohol.

One or two facts are worth mentioning as bearing on the American theory. One is that rose-growers are more and more insisting on the necessity for keeping the surface soil well stirred. Fruit-trees, too, grown in grass, never do so well as when grown in open soil. Another fact Professor I. B. Balfour mentioned the other day at the Royal Horticultural Society: in land continuously wet, so that it can never be aerated, the acidity is such that plants growing there seem half paralysed; they have difficulty in absorbing any of the abounding fluid. Lastly, it is a well-known fact that roots secrete acid in forcing their way through the ground, the acid dissolving the soil. There is, then, a good deal to be said for the American theory.—W. A. F. in the *Evening Standard*.

NOTE BY THE SCIENTIFIC OFFICER.

I have before me the Bulletin containing the theory put forward by Mr. Milton Withney which is quoted in the extract from the *Evening Standard* forwarded by "Stumped." I also have before me the copy of an address read before the Botanical Society of America and the Botanical Section of the American Association for the advancement of Science by Mr. C. G. Hopkins, on 27 December, 1911, answering the contentions of Mr. Withney very fully. This address has evidently escaped the attention of both the *Evening Standard* and "Stumped" and as it deals with the subject in a much more able way than I can hope to do, I propose to quote extensively from it. Mr. Hopkins said:—

"Briefly, it might be said that for nearly a century the world of science has accepted and taught, and the world of advanced agricultural methods has practiced, the doctrine that soil fertility maintenance and soil enrichment require the restoration or addition of plant food, including particularly phosphorus and nitrogen, which are most likely to become deficient in normal soils, potassium where needed and sometimes lime or limestone, which always supplies calcium, and magnesium as well if dolomitic limestone be used. Of the other five essential elements, carbon and oxygen are secured from the carbon dioxide of the air, hydrogen from water, and iron from the inexhaustible supply in the soil; while the sulphur brought to the soil in rain and otherwise from the atmospheric supply, resulting from combustion and decomposition of sulfur-bearing materials, supplemented by the soil's supply and by that returned in crop residues, appears to be sufficient to meet the plant requirements and the loss by leaching.

"After nearly a century of the increasing agricultural practice of this doctrine on much of the farm land of Germany, France, Belgium, Holland, Denmark, and the British Isles, those countries have approximately doubled their average acre-yields. The ten-year average yield of wheat in the United States is 14 bushels per acre, while that in Europe has gone up to 29 bushels in Germany, to 33 bushels in Great Britain, and to more than 40 bushels per acre in Denmark. The annual application of phosphorus even to the soils of Italy has already become greater than the phosphorus content of all the crops removed. The exportation of our highest grade and

phosphate rock from the United States to Europe now exceeds a million tons a year, carrying away from our own country twice as much phosphorus as is required for the annual wheat crops of all the states, and millions of acres of farm land in our own Eastern States have already been agriculturally abandoned, because of depleted fertility and reduced productive power; so that it is now impossible for our Congressmen to enter the capital of the United States from any direction without passing abandoned farms."

Now if we turn to the practical side and consider the results which have been obtained at Rothamsted, we shall find ample evidence that fertilisers are necessary to produce good crops year after year, and that Mr. Withney's statement that "soil does not need enriching and all soils, the richest as well as the poorest, contain sufficient fertilising material to ensure good crops" does not find support from actual field results. Thus:—

"Where-wheat has been grown every year since 1844 on Broadbalk Field at Rothamsted, England, the average yield for fifty-five years has been 12'9 bushels per acre on unfertilised land, 35'5 bushels where heavy annual applications of farm manure have been made, and 37'1 bushels per acre where slightly less plant food has been applied in commercial form.

"Barley grown every year on Hoos Field at Rothamsted has produced, for the same fifty-five years, an average yield of 14'8 bushels on unfertilised land, 47'7 bushels with the farm manure, and 43'9 bushels where much less plant food was applied in commercial form.

"Potatoes grown for twenty-six consecutive years, also on Hoos Field at Rothamsted, produced as an average, 51 bushels per acre on unfertilised land, 178 bushels where farm manure was used (reinforced with acid phosphate during the first seven years) and 203 bushels where plant food was applied in commercial form. The first year of the investigation the unfertilised land produced 144 bushels, land receiving farm manure alone produced 159 bushels, and land fertilised with commercial plant food produced 328 bushels per acre.

"Director A. D. Hall, of the Rothamsted Experiment Station, makes the following statement on pages 95 and 96 of his book on "The Rothamsted Experiments":—

"On the plots receiving farmyard manure, and even on those receiving only a complete artificial manure, the crop was maintained in favourable seasons. No falling-off was observed which could be attributed to the land having become 'sick' through the continuous growth of the same crop, or through the accumulation of disease in the soil."

"In commenting upon these same experiments, Milton Withney, Chief of the United States Bureau of Soils, makes the following statement in *Farmers' Bulletin* No. 257, page 14:—

"One of the most interesting instances going to show that toxic substances are formed and that what is poisonous to one crop is not necessarily poisonous or injurious to another is a series of experiments of Lawes and Gilbert—the growing of potatoes for about fifteen years on the same field. At the end of this period they got the soil into a condition in which it would not grow potatoes at all. The soil was exhausted, and under the older ideas it was necessarily deficient in some plant food. It seems strange that, under our old ideas of

soil fertility, if the soil became exhausted for potatoes, it should grow any other crop, because the usual analysis shows the same constituents present in all of our plants, not in the same proportion, but all are present and all necessary, so far as we know. This field was planted in barley, and on this experimental plot that had ceased to grow potatoes they got 75 bushels of barley."

"If now, we turn to the actual records of the Rothamsted experiments we find that the first crop of barley grown after twenty-six years of potatoes was 33'2 bushels per acre on unfertilised land, only 24'8 bushels where minerals alone had been used and the soil depleted of nitrogen by the potato crops, 67 bushels per acre where minerals and nitrogen had been used, and 72'4 bushels where farm manure had been applied for twenty-six years. We also find, in strict harmony with Director Hall's statement, that the largest average yield of potatoes from the farm manure plots (3 and 4), either for one year or for five years, was secured after potatoes had been grown on the same land for more than 15 years."

Mr. Withney states in the *Farmers' Bulletin* No. 257 :—

"Apparently, these small amounts of fertilizers we add to the soil have their effect upon these toxic substances and render the soil sweet and more healthful for growing plants. We believe it is through this means that our fertilizers act rather than through the supplying of food to the plant." (Page 20).

"There is another way in which the fertility of the soil can be maintained; viz., by arranging a system of rotation and growing each year a crop that is not injured by the excreta of the preceding crop; then when the time comes around for the first crop to be planted again the soil has had ample time to dispose of the sewerage resulting from the growth of the plant two or three years before Barley will follow potatoes in the Rothamsted experiments after the potatoes have grown so long that the soil will not produce potatoes. The barley grows unaffected by the excreta of potatoes, another crop follows the barley, and the soil is then in condition to grow potatoes again.

"In other experiments of Lawes and Gilbert they have maintained for fifty years a yield of about 30 bushels of wheat continuously on the same soil where a complete fertilizer has been used. They have seen their yield go down where wheat followed wheat without fertilisers for fifty years in succession from 30 bushels to 12 bushels, which is what they are now getting annually from their unfertilised wheat plot. With a rotation of crops without fertilisers they have also maintained their yield for fifty years at 30 bushels, so that the effect of rotation has in such case been identical with that of fertilisation." (Pages 21, 22).

Now this statement is to say the least of it incorrect. As Mr. Hopkins says :—

"If we turn to the Rothamsted data, we find the first recorded yield of wheat on the unfertilised plot on Broadbalk Field was not 30 bushels, but only 15 bushels; that the average of the first eight years was 17'4 bushels; that the best fertilised plot on the same field has averaged not 30 bushels, but 37'1 bushels for fifty-five years; that, as stated above, the wheat grown in rotation, following a leguminous crop, has averaged not 30 bushels, but 25 bushels on unfertilised land, and 34'8 bushels where fertilisers were applied for turnips three years before."

Mr. Hopkins concluded his address as follows:—

“A thousand additional proofs of the practical value and of the evident necessity of supplying plant food in systems of permanent agriculture could easily be cited.

“All long-continued investigations, and likewise, all practical agricultural experience show that great reduction in crop yields ultimately occurs unless plant food is restored to the soil; and, as a rule, the chemical composition of normal soil is an exceedingly valuable guide in determining the kind of material which should be supplied in practical systems of soil enrichment and preservation.”

We may take it then that the toxic theory is non-proven, and in the case of Coffee, rotation of crop is out of the question as a practical possibility.

As to the question of digging, it is possible that non-digging is being overdone. By ‘digging’ the scientist means the use of the fork or the mamotty, which turns over the soil to the depth of eight inches to a foot and cuts and kills the coffee roots. This is, in my humble opinion, at any rate, wrong. That it may be advisable if the labour is available to break up the top *inch* of soil under the mulch and replace the latter is a possibility. On soils which rapidly dry out and cake, this practice before the blossom showers has much to be said for it. But this is not digging in the ordinary sense of the word.

How the cutting to pieces of the Coffee roots each year can prevent Stump Rot I fail to see. The fungus by such a method is well distributed through the soil and innumerable wounds are made on the Coffee roots to give it a ready entrance. I believe there are many Coffee estates where the old practice of an annual dig is still carried out. Are these estates more free of Stump Rot than any others and do they persistently bear heavier crops?

The way to control Stump Rot and similar root troubles, is to remove stumps of dead and dying shade trees, to isolate patches of Coffee attacked by the disease by means of open trenches, and to regularly and systematically lime the soil, and once more I would say manure the Coffee regularly and systematically and do not chop up the established roots any more than can possibly be avoided.

R. D. A.

A Consular report from Mexico states regarding the year 1911:—

The coffee crop this year is an average one and prices are very good. In the canton of Coatepec it amounts to some 70,000 cwts., and in the cantons of Jalapa and Misantla to 25,000 cwts. A great deal of new planting has been done recently in the cantons of Jalapa and Misantla, and within the next two years the crop from these two cantons may be expected to double.

Oranges are now being very extensively planted, and as soon as proper facilities for exportation are arranged this district should become one of the great orange-producing centres of the world. The crop, which increases considerably every year, is for this year, between 80,000,000 and 100,000,000 oranges. These were principally consumed in the Republic, although quite a brisk trade was done with New York in the early stages of the crop. The picking begins in September, this giving growers here an advantage over those in the United States.

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THE U. P. A. S. I.

(INCORPORATED.)

The Annual Meeting, 1912.

Several delegates having requested him to fix the date of the opening of the next Annual Meeting about the time the S. P. M. R. Camp will close, the Chairman of the U. P. A. S. I. has appointed the 12th August 1912 as the opening day.

Application has been made for the use of the Mayo Hall, Bangalore, as the place of Meeting, from the 12th to the 17th August inclusive.

Office and Laboratory.

From 1st August 1912 the Association will take over from its present Secretary the lease of the premises now occupied as an office, and will also take over the adjoining Laboratory premises.

The Secretaryship.

Mr. Fletcher Norton, well-known as a planter, has been offered, and has accepted, the Secretaryship of the Association, and is to assume charge of his new duties on the 1st August 1912.

The U. P. A. S. I. Exhibition.

Planters are reminded of this fixture, and are requested to send in their exhibits as early as possible next month, so that all arrangements may be made in good time. It is hoped that the Exhibition will synchronise, as usual, with the Annual Meeting.

This Exhibition will be the third of its kind and it is hoped that planters will make an effort to make it a success. In 1910 a very small Exhibition was held as an experiment. It proved so popular that last year the idea was developed and a fairly large Exhibition was got together and this provoked much interest and proved of a high educational value. Planters from districts wide apart meet during the Annual Meeting week and they are naturally interested to know and to see what kind of products districts other than their own can turn out, and an exhibition of these products affords a valuable opportunity for comparing notes and getting hints.

Last year there was a really good show of Rubber and Coffee but Tea was poorly represented. It is hoped that this year Tea planters from the different districts will send samples designed to show what South India is doing with the product for which she has lately made such a good name in the market.

The exhibits last year were afterwards transferred to a special section at the Mysore Agricultural Show where the Rubber was much admired. Whether this will be done this year remains to be decided and must largely depend upon the nature and quantity of the exhibits sent in.

Scientific Officer's Papers.**No. CIII.—REPRODUCTION IN PLANTS.**

The essential feature of the sexual reproduction of both plants and animals is the fusion of two special kinds of cells, namely a male reproductive cell and a female reproductive cell, which after complete commingling of their parts give rise to a new cell capable of growing into a new individual organism. The two uniting cells, or *gametes* as they are called, are produced in special reproductive organs which are the essential parts of flowers; the male reproductive cell is enclosed within the pollen grains produced in the stamens, and the female reproductive cell lies within the ovule.

Pollen grains vary very much in form, size, and colour and they are very beautiful objects under a microscope. When a pollen grain is placed in a weak solution of sugar and kept at a suitable temperature it absorbs water and emits a slender tube-like structure; the nucleus which is present in it travels into this tube and takes part in the fertilisation process to be described presently.

The ovules are minute roundish bodies found in the ovary of the flower. At the apex of each ovule is a very narrow canal, known as the *micropyle*, and inside it is the female reproductive cell called the *ovum*, or egg-cell.

Now when a pollen grain is placed on the stigma of a suitable flower it germinates and produces a tube as it does in a solution of sugar as described above. This pollen tube penetrates into the tissues of the stigma, rather like a root growing into the ground, and so down through the style till it reaches the ovary at the base. This process takes anything from a few hours to a few weeks, depending on the kind of plant. When it reaches the ovary the pollen tube is guided in a way which is not altogether understood to the micropyle of one of the ovules and passes through it into the ovule itself. Here the end of the tube is dissolved and the male nucleus, the actual male reproductive cell, passes out and fuses with the female reproductive nucleus contained in the ovule, and a new plant is born. This fusion of the two cells, male and female, is the essential feature of the sexual act in plants, as in animals, and is spoken of as *fertilisation*. Unless the ovum is fertilised in this way both it and the ovule wither and die, but as soon as fertilisation is effected the ovum begins to divide and grow, developing into an embryo plant, the whole ovule finally becoming a *seed*.

After fertilisation has been effected the style and stigma have done their work, as has also the corolla, and these consequently wither and fall off, while the stimulus of fertilisation causes the tissues of the ovary wall to grow and the gynaecium of the flower becomes a fruit, in some cases a comparatively large body.

Only a single pollen grain is necessary to fertilise a single ovule and more pollen is always produced by flowers than is necessary for the impregnation of all the ovules within the carpels. In the case of flowers with more than one ovule it sometimes happens that not all are impregnated, and in consequence the fruit becomes one sided and unsymmetrical in form. A common instance is the formation of 'pea berry' in Coffee which is brought about by the fertilisation of only one of the two ovules in the ovary. The unfertilised ovule dies and the fertilised one takes up the whole space in the fruit, and lacking the pressure of the second ovule, becomes round instead of flattened by contact with the second 'bean.'

RUDOLPH D. ANSTEAD, *Planting Expert*.

DISTRICT PLANTERS' ASSOCIATIONS.**Kanan Devan Planters' Association.**

Proceedings of an Annual General Meeting held in the High Range Club, Munnar, on Saturday, June 1st, 1912.

PRESENT.—Mr. C. Fraser (in the Chair), Messrs. W. J. Dixon, D. Mackintosh, A. Blair Hill, L. H. Ley, J. C. Swayne, J. M. Bridgman, G. E. Bewley, Dr. J. S. Nicolson, M.D., Messrs. M. C. Koechlin, W. L. Ranking, E. E. Williams, J. H. Jeffreys, H. W. Smith, S. H. Paulet, J. A. Gwyme, A. J. Wright, W. Mackenzie A. J. Imray, H. I. Pinches, A. H. Dixon, R. Hedger, E. R. Howlett, A. Yates, W. O. Milne and F. R. Westbrook, by their proxy Mr. E. A. Hughes.

Honorary Member :—A. W. L. Vernede, Esq.,

The notice calling the meeting having been read, the minutes of the last year's General Meeting having been printed and circulated, were taken as read and approved. The following agenda was then laid on the table :—

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| (1) Chairman's Speech. | (8) Scientific Officer. |
| (2) Honorary Secretary's Report. | (9) Local sale of Fluff and Refuse Tea. |
| (3) Accounts. | (10) Bangalore Delegate. |
| (4) Labour Laws. | (11) Vaisy Valley Railway Scheme. |
| (5) Post Offices. | (12) Correspondence. |
| (6) Theni Bridge. | (13) Roads. |
| (7) Game Laws. | (14) Election of Office-bearers. |

On opening the Meeting, the Chairman said he was very pleased to see so many Members present. As there was a very long Agenda he asked the permission of the meeting to take the second item of the Agenda first. He did not wish to make a long speech and he felt the Honorary Secretary's report which was a full one, would explain the Association's work for the past year very clearly. If, after it had been read, there was anything he wished to make any remarks on, he would do so. This was agreed to.

The Honorary Secretary then read his report as follows :—

"Mr. Chairman and Gentlemen,—I shall endeavour to be as brief as possible in submitting a short summary of subjects dealt with during the year by the Association.

The following figures showing approximately the acreage under cultivation and outturn of produce are of interest to us all :—

The total acreage under Tea is now 17,047 acres, against 15,136 last year, roughly an increase of 2,000 acres. The total crop of Tea from the District was 8,204,697 lbs., as against 7,509,665 lbs. This is an increase of 9 per cent. which is very satisfactory and the outturn per acre compares most favourably with any other Tea district. The total area under Coffee is 1,028 $\frac{3}{4}$ acres and there are 795 acres of Cinchona. The above total includes 179,375 lbs., of green teas.

The Rubber in the district is gradually increasing its yield and very satisfactory prices have been obtained. There is a very promising future in front of this industry. Besides this, there are 1,610 $\frac{1}{2}$ acres under Cardamoms, 429 Sisal, 114 Camphor, and 20 under Cocoa, all of which are progressing satisfactorily and giving good results. I regret I cannot give actual crop figures as they are not all yet to hand.

I am glad to say the year under review has been a most successful one for Tea. The average price obtained is the highest on record and the result has been extremely satisfactory to all concerned. Let us hope this happy state of affairs may long continue.

During the year ten Committee Meetings and the Bi-Annual General Meeting were held.

There is a proposal for discussion and settlement to-day with regard to the Local Labour Laws.

The Medical Grants have been regularly paid by the Government, and we are all very grateful to His Highness' Government for their generosity. The increase of cultivated area and the welfare of the coolies have necessitated the building of additional Dispensaries. Although, so far, Government has not seen its way to increase the Grant-in-Aid I hope that they may shortly do so.

I am sorry to say that progress with regard to the construction of the Theni Bridge has been most unsatisfactory. Although the work has been in hand for a long time past, a great deal still remains to be done and the whole District still suffers from the dislocation of traffic.

There are at present 30 Estates on the books, paying a subscription of Rs.10 each and a cess of 1 anna per acre on cultivated area. It is proposed to double this cess, as by doing so we will obtain the services of the Scientific Officer and come into line with all other Associations. I am sure you will all agree that this proposal is a wise one, for while we all know the district is extraordinarily fertile and most of the cultivated area is quite young, still we are bound to benefit by expert and scientific advice and help.

I regret that the Local Post Office working still remains most unsatisfactory. Owing to the action, or rather want of action, on the part of the British Government, the Postal authorities are not able to run the Mails, except during the hours of daylight, and in spite of our efforts and strongest protests, our postal facilities have been seriously curtailed. We have been told that the present arrangement is the best possible under the existing conditions. I am sure, however, you will all agree that the existing conditions are most discreditable to, and reflect very seriously on, the authorities concerned. It is almost incredible, seeing the importance and value of the interests concerned that Government cannot, or will not, arrange for the safe transit of His Majesty's Mails at any time and should allow such a disgraceful state of things to continue. I suggest, if our last appeal to Government does not lead to an improvement, the whole matter be brought up in Parliament. I am certain Sir J. D. Rees, who is a Director of one of our Companies, would be only too glad to take the matter in hand. In this connection, I would like to mention the continued efforts on the part of the S. P. O., Madura, to better things, but, of course, he can do little until Government acts.

The law for the better protection of Game in Travancore is making steady progress, and I think in a short time we shall arrive at a satisfactory arrangement. The recent Arms Regulation Act is a step in the right direction, and I am sure, has every one's approval.

The Fish Committee have continued their efforts to introduce Trout into the rivers and streams, and it is very satisfactory to be able to report that, in spite of all difficulties, their efforts have been successful.

The matter of the Cambum Valley Light Railway has been pressed on the notice of the Authorities, but so far I regret to say, without much success. I hope, however, that continued effort in this direction may lead to a successful result and the district benefit by the construction of this much-needed work.

It was decided during the year that the Association join the L. A. N. Institute, and you will all be pleased to know that for our annual subscription, the Members (including their wives and families) are entitled to its benefits.

Mr. Martin was our representative at the Annual Meeting of the U. P. A. S. I., and it is needless to say he did his utmost to help and advance not only our own interests, but those of the whole planting community in South India. We are deeply indebted to Mr. Martin and I consider we should thank him very heartily for his help and continued effort with regard to our labour and interests generally. We all appreciate very highly the honour of Mr. Martin's election to the Vice-Chairmanship.

Mr. Wright was our Delegate at the Sri Mulam Popular Assembly. His efforts to forward our interests were most successful and we are all very much obliged to him for his good work. I hope you will confirm this latter.

The Association was instrumental in obtaining help for the son of one of its old Members from the S. I. P. B. Fund. I refer to the case of Edward Claridge.

The Association decided to include as Members, the heads of the Medical, Engineering and Transport Departments, and I am sure you will all agree we shall benefit by the advice and help of these gentlemen.

In placing the accounts before you, I beg to move a hearty vote of thanks to Mr. Gwynne, who kindly audited them. The books, papers, &c., are all on the table for your inspection. I have nothing further to say, Gentlemen, and in placing my resignation in your hands, I beg to thank the Committee and all Members very heartily for the ready help they have afforded me in carrying out my duties during the past year.

The Chairman then addressed the Meeting and said he was sure they were all very much obliged to Mr. Hughes—for his very thorough and careful report. The year under review had been a quiet and successful one, and conditions in the district generally, as the report shows, made steady progress and good work had been done by the Association. He regretted to inform them that although the work on the Theni Bridge had been going on for the past two years, the condition of things was very much worse than ever. He had a proposal on the subject to bring forward when he would say more about the matter. There are several interesting proposals on the agenda for consideration, notably the question of engaging the services of the Scientific Officer, Game Laws, and the Vaigay Valley Railway Scheme. He would not detain them longer and begged to propose that the Honorary Secretary's report be adopted. This was agreed to and carried unanimously.

The Honorary Secretary explained the financial position of the Association and the books were circulated for inspection. The position was considered satisfactory and the accounts adopted unanimously.

Labour Laws.—Mr. Bridgman then addressed the Meeting on the subject of Local Labour Law. He said that in his opinion, both Kanganies and coolies were trading upon their knowledge of six months limit in the low country, Rule 4, section 3. He found that Kanganies were in the habit of letting coolies go down to the low country and sending them up almost exactly to a day after the expiry of the limit and he thought that either the limit should be raised to one year or abolished altogether. He, therefore, proposed "that the period of 'six months' in para. 3 of Rule, 4 be altered to one year and given a trial for one year. In the event of there being no improvement, the limit be abolished altogether." This was seconded by

Mr. Gwynne, who said his experience was the same as Mr. Bridgman's, and thought a longer period would be an improvement. After some discussion the resolution was put to the Meeting and lost; only the proposer and seconder voting in its favour.

Post Offices.—Mr. Wright then read the following proposal:—

"That in view of the representations which have been received on the subject of the Post Office arrangements of the District since the Bi-Annual General Meeting on the 3rd of February, this Association desires to record its appreciation of the attention given to the needs of the District by the S.P.C., Madura, in doing all that seems possible to meet the wishes of the Association and the community generally under the existing conditions." This was seconded by Mr. A. Blair Hill and carried unanimously. The Chairman proposed "That the Honorary Secretary send a copy of the Resolution to the S. P. O., Madura," and this was agreed to *nem. con.* In this connection it was decided "That the Honorary Secretary again approach the British Government with reference to the carriage of the Mails, and in the event of their taking no action to ensure their safe conduct at any time, the matter be referred to Sir J. D. Rees, one of the K. D. H. P., Company's Directors, and that he be asked to kindly bring the matter to the notice of the Secretary of State for India, in Parliament."

Theni Bridge.—The Chairman proposed: "That this Association begs to draw the attention of the Government to the very unsatisfactory work put into the Theni Bridge and to the unnecessary delay and expenditure caused thereby, and that this Association does again earnestly request the Government to give this most important work its very immediate attention." Mr. Fraser said that although the work had been going on now for two years, only five arches had been completed, two of which had collapsed. One of these had again been re-built, and had again collapsed and only three arches are now standing. He understood Rs.27,000 out of Rs.30,000 sanctioned for the Bridge, had already been spent. He also understood that the Local Board had decided to pull down the present three arches and entirely re-build the Bridge as they had come to the conclusion that the bricks being used for the work were unsuitable. He felt that all would agree this was a most unsatisfactory state of affairs and hoped if this resolution was agreed to, that their representation to Government might result in this very important work being speedily and satisfactorily completed. The resolution was agreed to, *nem. con.* Mr. Bridgman proposed and Mr. Koechlin seconded "That a copy of the Resolution be sent to the Peermade Association, asking them for their support in the matter." This was agreed to, and carried unanimously.

Game Laws.—Mr. Koechlin then read the following proposed alterations and additions to Regulation 3 of 1073. To be added to clause 3:— "Sambhur (*Cervus unicolor*). Immature males being in the case of Bison, 34 inches widest spread; in the case of Ibex, 13 inches saddle backs only, and in the case of Sambhur, 28 inches length of horns." "That the number of heads to be shot in a season be in future limited to two Bull Bison, three Saddle Backs, four Sambhur Stags and three Spotted Deer Stags." "That no change be made in clauses 4, 5, or 6." "That there be added to clause No. 7 after the words Public Treasury—to the credit of the Travancore Game Preservation Regulation No. 3 of 1073." To be added to schedule No. 1 "that the above should include any part of the concession not falling within the specified boundaries." "That there be added to schedule No. 2 that the close season be altered to 15th of May—15th of September inclusive, instead of as it is at present, 31st of May—1st of October." After

some discussion the Chairman proposed "That the Association ask Government to adopt the alterations suggested," and this was carried unanimously.

Scientific Officer.—MR. HUGHES then read the following Resolution:—

"That this Association, having first obtained the consent of the Directors of the various interests concerned, agrees to raise the extra cess required to obtain the services of the Scientific Officer."

He explained that this meant an increase of 1 anna per acre all round on cultivated area. The extra expenditure was so small and advantages that would be obtained so valuable, that he hoped all would agree to the proposal and the arrangement be carried out. The K. D. H. P. Co. had a Scientific Officer of their own some years ago, and the Association had therefore never joined the Scientific Officer Scheme, being the only one in South India that had not done so. He felt sure all would agree that the matter was one of the utmost interest and importance to them all. The old methods were all very well and things had gone along all right so far, but scientific enquiry and methods had so greatly advanced cultivation and treatment of all products that if they wished to keep in the front rank and gain the utmost value from their various industries every advantage should be taken of the Expert's knowledge, advice and help. So far the District had flourished exceedingly, and blights, &c., had had little or no effect, but we could not hope this state of things could go on indefinitely. As the various Totes got older, blights would have more and more effect and tend to spread and the sooner scientific steps were taken to prevent this the better. There were the questions of manures, both chemical and in the form of green crops, methods of manufacture, &c., and here expert advice would be invaluable. They would also have the advantage of using a well equipped Laboratory for analytical purposes, &c., and the knowledge thus obtained must be of the greatest value to all concerned. He hoped the Meeting would agree to this proposal. Mr. Gwynne, before seconding the resolution, asked if steps had been taken to ascertain the wishes of the Managing Agents with regard to it. Mr. Hughes explained that he had written to all concerned and had received favourable replies. The proposal had been referred to the Directors of the K. D. H. P. Company and he now awaited their decision, but did not think there could be any doubt as to what it would be. Mr. Gwynne then seconded the resolution. The Chairman said he fully agreed with all Mr. Hughes had said and felt that if they wished to go on and prosper, they must keep up-to-date in every possible way. He could assure them that as far as the Malayalam Company was concerned the increased cess would be sanctioned. Mr. E. E. Williams also supported the resolution and said he felt sure the Scientific Officer's help and advice would be of great value. His interests would agree to pay the increased cess. He stipulated, however, that if engaged, any reports the Scientific Officer might make were to be treated as private and on no account to be published without the consent of the interested parties. All agreed to this, and after some discussion, the resolution was put to the Meeting and carried *nem con.*

Local Sale of Fluff and Refuse Tea.—The CHAIRMAN then read the following proposal:—

"That with a view to stopping thefts of Tea from Factories, the sale of Tea Fluff and Refuse, Bodi delivery, be discontinued, and that Superintendents be requested to obtain the necessary permission to do so."

He said that he felt the sale of Fluff, &c., opened the door to Tea-makers stealing good quality tea and sending it away mixed up with the Fluff. He had a case recently in his own Factory and thought that if local

sales of tea were stopped altogether, it would make it very much more difficult for dishonest Tea-makers to dispose of stolen tea. He had seen so-called Fluff and Sweepings in Bodi that contained 50 per cent. of more or less good tea and was certain that if local dealers gave good prices for these grades, it was because it paid them to do so owing to the good tea they got with them. He thought this should be put a stop to and hoped the Association would support his resolution. Mr. Wright said that he thought they should be very careful in interfering with sales of tea locally as there was a profitable and growing trade in lower grade teas which he thought should be encouraged as far as possible. He pointed out that at present all sales at the Factories had been stopped as far as the K. D. H. P. Company and A. A. D. T. T. Company were concerned and that no sale could be effected until leave had been obtained from Headquarters and samples submitted. Most sales were for Kodaikanal Road delivery a few being for Bottom Station delivery.

He suggested that as far as Fluff was concerned, sales should only be arranged with *bonâ-fide* buyers who used it for dyeing purposes, &c., and who would not object to its being denatured by the use of lime. Mr. Swayne agreed with the Chairman and thought open sales of Fluff and Refuse locally should be discontinued. A good deal of discussion took place and Mr. Hughes pointed out that if a Tea-maker was dishonest it was almost impossible to stop petty thieving. The only remedy was an absolutely reliable man. The resolution was then put to the Meeting and lost.

Bangalore Delegate.—The Chairman proposed "That Mr. A. Ff. Martin be elected as the Association's Delegate at the U. P. A. S. I. Meeting, any particular instructions to be given him later. This was agreed to *nem. con.*

The Vaigay Valley Light Railway.—Mr. Hughes then brought forward the matter of the Vaigay Valley Light Railway Scheme. He said that the Association could shew that if constructed, this railway would pay very handsomely, anything from 15 to 20 per cent. exclusive of a liberal deduction for depreciation, &c. He had written to the Government and South Indian Railway Authorities, giving these figures, &c., but had not got much satisfaction. The last letter from Government referred him to the Chairman of the Madura Local Board. Seeing how rapidly the districts it would serve and tap are growing and the increasing volume of traffic to be dealt with, he was certain they all agreed it was a work of the utmost importance and urgency to all concerned. A large sum of money had already been raised towards the construction by Government Kists and he felt that if a private Company could be formed to take up the work there would be no difficulty in obtaining the necessary capital. The scheme, however, was one of several in the hands of the South Indian Railway, and as it came 5th or 6th on the list, there was little likelihood of its being taken in hand for some years. The Peermaad Association promised to help as far as possible. Mr. Wright proposed:—

"That in view of the recent communications from Government, this Association approaches the Chairman of the Madura District Board, drawing his attention to the urgent necessity for the construction of this line and asking for information as to the future policy of his Board with regard to the scheme."

This was seconded by Mr. Ranking and carried unanimously. It was agreed that, in the event of the Madura District Board Chairman's reply not being satisfactory, a deputation from the K. D. P. A. and Peermaad Planters' Associations approach Government on the subject and endeavour to arrange for the immediate construction of the line.

Correspondence.—The two letters from Mr. Ormerod announcing his resignation were then read. The Meeting regretted Mr. Ormerod had resigned and agreed to support the U. P. A. I. in any arrangement they made for carrying on his work.

Mr. J. A. Richardson's letter, *re.* the recent Government regulations prohibiting the importation into Travancore of tobacco by post, was read and the Meeting decided to support Mr. Richardson in his efforts to have the regulation amended.

Roads—Mr. Hill then brought up the question of roads and regretted that in spite of all the Association's efforts they were still very far from being in a satisfactory state of repair. He complained particularly of the Northern Outlet Road, especially the Marioor-Chinnar section. This road had necessarily to be used for heavy traffic and in parts that particular section was almost impassable for heavy trolleys. He thought the Association should again approach Government and urge the importance of having the road put into really good order with as little further delay as possible. Mr. Williams explained that the repair work done for the past three years on that part of the road had not been very good. Government were now working at it and had built several revetments and were spending a good deal of money generally. He now had the contract and had large quantities of metal, &c., ready. This would be laid down as quickly as possible and the road thoroughly repaired.—Recorded with satisfaction.

The Chairman and Committee having resigned, Mr. Vernede was voted to the chair during the election of new Office-bears. The following were elected:—Chairman—C. Fraser, Esq.; Honorary Secretary—E. A. Hughes, Esq.; Committee—Messrs. A. J. Wright, H. L. Pinches, M. C. Koechlin, A. J. Dixon and J. M. Bridgman.

Mr. Fraser having returned to the chair said he begged to thank them for the honour they had done him. He would do his best to forward the Association's interests. He was glad to see so many of the younger members present. At future meetings he hoped to hear more from them. There were many old heads on young shoulders and he felt they might all benefit by the opinions and suggestions of the younger members. He asked the Association to record a very hearty vote of thanks to Mr. Martin for his work as Delegate at Bangalore. This was carried unanimously. He also proposed a vote of thanks to Mr. Gwynne for auditing the Association Books and to Mr. Wright for his good work at the Sri Mulam Popular Assembly.—Carried *nem. con.*

The Chairman then asked the Meeting to record a very hearty vote of thanks to the Honorary Secretary for his work and efforts in the Association's interests during the past year. Mr. Hughes had given a great deal of his time, and he was sure they all greatly appreciated his work. This was carried *nem. con.*

Mr. Hughes thanked the members for the vote of thanks and for the honor they had done him in re-electing him as Honorary Secretary, and promised that what he could do to help the Association he would do.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) C. FRASER,
Chairman.

Letchmi Estate, 11th June, 1912.

(„) ERNEST A. HUGHES,
Honorary Secretary.

IN LIGHTER VEIN.

A Red Letter Day.

(' This is a red-letter day,' etc.—Scientific Officer, Chikmagalur,
May 25th, 1912.)

Brightly dawns the long expected morning.
Beams 'old Sol' on Busanhulli's Club,
For at length in spite of scoffer's scorning,
We're to-day of universe the Hub.
Lo! Behold the 'ejman' of the Senate
With a caprine gurgle leaps from bed,
Dons his garments fresh from Wrenn and Bennett,
Deftly 'topi' fits on swollen head.
We, in darkness far too long have wandered
Without Science, devastating totes,
All our youthful energy we've squandered
And Brazil continually gloats.
Some of us, alas, 't must be admitted
With or without scientist would fail,
Quite a few deficiently are witted,
Some through 'anno domini' are stale.
Mark, a Northern chieftain gorging 'chota!'
See the grim manœuvres of his mouth,
As he soon, with partly swallowed bloater,
Button-holes a chieftain from the south.
He, his shaggy mask at once inclining,
Gravely listens and as gravely grunts,
And, at length, mysteriously signing,
Each his errant secretary hunts.
These enthusiasts at last are sighted
Waiting outside scientific door,
Each with self importance quite delighted,
Each with cigarette well stuck in jaw:
"A-st-d is within?" it is suggested,
"True, his pleasure now do we await"
"Is Fr-t-ni up and is he rested?"
Then the four at once gesticulate:
"See he comes, our scientist well trusted!"
Deep obeisance make the sapient four,
But our A-st-d is not to be busted,
Shuts he in their faces, soon, his door.
In the meanwhile, all who seek salvation
Do with one accord the scheme discuss,
Everywhere is seen much agitation,
Everywhere is hurry, scurry, fuss.
And the buzzing office-bearers babble,
Laws lay down with ignorance profound,
Each intoxicated with his gabble,
Each delighted with his voice's sound.
Now, the fateful hour of ten is ringing,
Now, the Senate House is thronged with Wit
And, without, the little birds are singing,
While within all breathlessly we sit.
One great Councillor, with nerve abounding,
Self-appointed chairman takes the floor,
On his hind legs, with a grunt astounding,

Starts proceedings thus:—"Haw Haw Haw Haw."
 He, with rhetoric now celebrated,
 Prays great A-st-d to address the throng.
 Science, slowly rising, looks elated,
 Bursts forthwith into manurial song.
 Soon an ignoramus puts a query,
 Whether 'Rough on Rats' is good for mice.
 Science answers, looking somewhat weary,
 "Ask Fr-t-ni, he will give advice."
 Now, superfluous questions are showering
 On our scientist's devoted head,
 Lack of knowledge shown is overpowering,
 Few, for shame! their 'Chronicle' have read!
 A. regards his 'legume' with suspicion,
 B. much fears his 'nodule' is diseased,
 C. about his 'black rot' wants tuition,
 D. with 'mulch' is very much displeased.
 E. to Z. are mostly agitated,
 Some are very needful of advice,
 Others do require it to be stated
 How to act to quickly raise 'our price.'
 When, at length, manurial concert ended,
 Then, our Mentor, rising to his feet,
 Shows Fr-t-ni's form on chair extended,
 Introduces, sighs, and takes his seat.
 Rage! Brazil, and howl! poor Costa Rica!
 Mexico and Guatemala too!
 Now your attitude will soon be meeker,
 Tremble! quake! now what won't Mysore do!
 Epoch marking day! for young Fr-t-ni.
 Well is girt for scientific fight,
 Youthful champion! he looks quite beany,
 On chaotic totes Let there be Light!
 Thus, auspicious installation closes
 And the senators sit down to feed,
 Bent o'er soup are legislators' noses,
 As they prate of 'legume' and of weed.
 But, with pride on many a tote next morning,
 Surely will the husbandwoman hear!
 How, in conclave, criticism scorning,
 Boldly babbled 'Hubby' without fear.
 Dies, at length, this day so epoch marking,
 In the calendar we've all marked red,
 Soon the Busanhulli dogs are barking,
 And each senator doth seek his bed.

(Busanhulli Bard).

RUBBER IN THE BELGIAN CONGO.

Planting was commenced in 1893 of *Manihot Glaziovii*, in 1894 of *Funtumia* and in 1896 of *Hevea*. These first plantings were rather experimental than otherwise, the number of trees, being small. It was only about 1897 that regular plantations were started, and by private enterprise. By 1900 several companies had established relatively important plantations, one of them having over 24,000 *Manihot* trees, while another has 3,000 *Heveas* and 150 *Ficus Elastica* trees.

RUBBER

Diseases of Rubber Plants.

Mr. Herbert Wright delivered his fifth and last lecture at the Imperial College of Science on Monday afternoon May 13, 1912. He pointed out how in the past the best agricultural yields had frequently been obtained on small plots; when large acreages of the same species of plant where under cultivation any disease or pest, no matter where it was carried by wind, always found the same food supply available. This continuous uninterrupted food supply greatly assisted dangerous diseases and pests in their spread. To some extent their ravages could be checked by retention of forest belts, adopting only small acreages isolated by other products, or mixing of products on plantations. Mr. Wright pointed out, however, that many of the wild trees and cultivated products might themselves serve as a source of new diseases and pests which might adapt themselves to rubber trees. He, therefore, believed the only reliable course to be the appointment of plant sanitation officers for estates whose duty would be to inspect and treat all affected trees promptly, to see that proper implements and chemicals were always kept in stock, gangs of coolies were always at work cutting out diseased bark, pruning branches suffering from dieback, isolating trees attacked by *fomes*, and attending to the usual operations necessary to keep the diseases in check.

In his opinion there were four most important rubber diseases. The first was that which caused canker in the stem and known also to affect the fruits (*Phytophthora*); the second was the pink fungus (*Corticium*), which was doing such enormous damage in Java and elsewhere; the third was that causing dieback (*Botryodiplodia*) of the upper parts of the trees and the ends of branches; the fourth was *Fomes semitostus*, which, with or without white ants, was already responsible for the death of thousands of *Hevea* trees every year. It must not be forgotten that these really dangerous diseases occurred on the fruits, branches, trunks, and roots of *Hevea brasiliensis*.

He complained that so few people realized the gravity of the position, for whereas they would agree to provide one white man to supervise every 300 acres of *Hevea* for tapping and general cultivation, only one mycologist was provided for 220,000 acres of *Hevea* in Ceylon, and two for 400,000 acres in Malaya. It was impossible for one plant sanitation officer to deal with anything like such an acreage. He regarded the paucity of scientific officers on rubber estates as one of the gravest errors of our administration, and appealed to private companies and Government to tackle the problem now while diseases and pests were in their infancy. It was pleasant to be able to record that now we had at last one institution wherein men could be trained for such posts, as well as in any other university in Europe. He trusted that as Great Britain had led the plantation industry so far, it should not neglect one of its most valuable assets. The rubber plantation industry, if maintained in a healthy state, would bring to this country alone some twenty to thirty million sterling annually; if it were not protected against disease it may easily go the way of coffee and cinchona.

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Scientific Officer's Papers.

CIV.—FERTILISATION OF FLOWERS.

The fertilisation process in flowers is dependent upon the deposition of the pollen grain on the stigma of the flower. The pollen tubes on germination have no power of penetrating the tissues of the style except when placed upon the specially receptive stigma. This necessary transference of pollen grains from the anthers on to the stigmas is called *pollination*.

When the stigma receives pollen from the anthers of the same flowers the latter is said to be *self-pollinated*, or *self-fertilised*; frequently, however, the stigma in one flower receives pollen from a flower on another distinct plant, in which case the flower receiving the pollen is said to be *cross-fertilised*. Another variation is intermediate between these cases, namely when the pollen of a flower is transferred to the stigma of another flower growing on the same plant.

Now most plants have their sexual organs close together in the same flower so at first sight it might appear that self-fertilisation would be the rule among flowering plants, and undoubtedly many plants are self-fertilised. But careful and extensive observation of flowers has shown that a large number of plants are cross-fertilised and experiments have proved that the plants derived from seeds which have arisen from cross-fertilised flowers are in the most cases more robust in constitution and reproductive of more and better seeds than those arising as a result of self-fertilisation.

A great many devices are found among flowering plants to ensure a preponderance of cross-fertilisation over self-fertilisation. The chief of these are the following :—

(1.) The sexual organs may be produced in separate flowers, either on the same plant or on different individual plants, as in the case of the Papaw.

(2.) Although the male and female sexual organs may be in close proximity in the same flower they frequently do not ripen together. This is the case with the coffee flower where the stigma is ripe and receptive before the stamens in that flower ripen and set their pollen free.

(3.) The relative position of the anthers and stigma is often such that the transference of pollen from the former to the latter is a matter of difficulty.

(4.) In the case of many orchids the pollen has no fertilising effect upon the ovules produced in the same flower; such flowers cannot be self-fertilised at all.

Since pollen grains have no power of spontaneous movement they must be carried from one flower to another by some outside agency, and wind and insects are the most important of these agents. Almost all the grasses are wind pollinated. Their flowers are small and inconspicuous without scent or honey and the pollen grains are light and smooth while the stigmas are large and feathery and especially adapted to catch the floating pollen grains from the air.

Insect pollinated flowers usually have brightly coloured sepals or petals, are often highly scented, and are furnished with special glands, called *nectaries*, which secrete a sweet liquid commonly referred to as 'honey.' The pollen grains in such flowers usually have rough sticky surfaces which enable them to readily cling to the bodies of insects, while the stigmas are comparatively small and often exude a viscous substance to which the pollen grains easily adhere and in which they readily germinate.

The insects which visit flowers are chiefly beetles, flies, moths, butterflies, and bees. The colours of flowers, their odours, the nectar which they secrete serve to attract these insects and even enable the latter to distinguish one kind of plant from another. In their search for nectar such insects unconsciously bring about cross-pollination of the flowers.

In the case of open flowers a large number of different kinds of insects are attracted and many of them creep about and simply effect self-pollination. But in many cases the nectar is secreted and stored at the base of long tube-like corollas where it can only be got at by insects possessing long tongues. In these cases the anthers are so arranged that they must be touched by the body of the visiting insect and the pollen dusted upon it, often at some particular point, which point is brought into contact with the stigma of a flower subsequently visited and cross-fertilisation is brought about in this way.

An example of a flower arranged in this way is familiar to every one in the Snapdragon, but the numerous devices to ensure the visits of particular insects only, and through them cross-pollination, is a fascinating study and one about which many books have been written. The different colours, shapes and scents of plants are intimately connected with the visits of certain special insects and complicated devices for cross-pollination. Some flowers are so highly organised in this respect that they can only be fertilised by one particular kind of insect. The vanilla flower is a familiar example; this can only be fertilised by one particular kind of moth and when vanilla is grown in a country where that moth does not exist artificial fertilisation by hand must be resorted to in order to obtain a crop of beans.

Although many flowers are unable to produce seed, or produce but few, when insects are excluded, others which show special adaptation for cross-pollination by insects, and which are usually pollinated by these agents, have also the power of self-fertilisation and often exercise it in dull weather or at other times when insect visitors are scarce. Coffee is probably one of this class of plants. It is most advantageously cross-pollinated by bees and other insects but in their absence it can effect self-fertilisation. Such flowers are often so arranged that self-fertilisation shall take place in the event of cross-fertilisation failing as a kind of last resource.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**The South Mysore Planters' Association.**

Proceedings of a Meeting held at Lingapur, on July, 4th, 1912.

PRESENT.—Mr. F. M. Hamilton (President), Hon'ble Mr. P. F. X. Saldanha, Messrs. C. J. Hayward, H. F. Anderson, W. F. Scholfield, S. Sladden, J. G. H. Crawford, Thiselton Anderson, W. L. Crawford, and M. J. Woodbridge (Honorary Secretary.)

The minutes of the last meeting were taken as read and confirmed.

Instructions to Delegates to the U. P. A.—The agenda of the U.P.A. was gone through and instructions to the delegates were given on various points.

Kalisyndikat's Offer.—This was accepted and a vote of thanks passed to Mr. Anstead for the trouble he had taken in the matter.

Registration of Maistries.—A scheme for registration of maistries was brought before the meeting by the Committee appointed at the last meeting for this purpose.

The majority of the meeting was, however, against any form of registration and after a long discussion the following resolution was carried :

Proposed by Mr. W. L. Crawford,
seconded by Mr. Thiselton Anderson :

“This Association consider that at present the time is not ripe for a general registration of maistries, but thinks a beginning might be made by each Association keeping a Black List upon which all defaulting maistries of that Association be annually entered, and that this list be open for the information of the members of this and other Local Associations joining the scheme.”

The Honorary Secretary was asked to write and forward copies of this resolution to the other Mysore Associations and to Coorg.

Election of Honorary Secretary, Saklasapur Group.—Mr. W. F. Scholfield was duly elected.

Election of members of the Council of Mysore Planters' Associations.—Messrs. F. M. Hamilton and W. L. Crawford were elected, the Honorary Secretary (Ex-officio) being the third.

The minutes of the meeting of the Council of Mysore Planters' Associations held at Chickmaglur on May 24th were read and explanations given on several points by the South Mysore members.

Coffee-land Assessment.—Transfer of Coffee Land from temporary to permanent tenure.

Mr. W. L. Crawford gave a report on his interview with the Mysore Government Revenue Commissioner on this subject and said that he had been asked to get a ruling from the Deputy Commissioner of Hassan on the point in question. (*i.e.*) that planters now holding coffee land on 30 years' tenure should be allowed to put such land on permanent tenure and be granted title deeds for same without penalty. This can only be done at present by paying excess tax for the last 30 years.

It was decided that the Association should take the matter up when the required ruling of the Deputy Commissioner has been obtained.

Subscription to the International Rubber Exhibition held in London last year.

It was decided to place the amount of subscription refunded to the credit of the Association.

The meeting closed with a vote of thanks to Mr. Scholfield for the use of his bungalow.

(Signed) M. J. WOODBRIDGE,
Honorary Secretary.

Bababudin Planters' Association.

Proceedings of a Quarterly General Meeting of the Bababudin Planters' Association held at Chickmaglur on Wednesday, July 3rd, 1912.

PRESENT.—Messrs. Denne (President), Hugonin, Watson and Kirwan (Honorary Secretary), Honorary Member Mr. A. Subrahmanya Iyer.

The minutes of the previous meeting were taken as read.

M. & S. M. Ry. Unloading Charges.—The Honorary Secretary was instructed to write Mr. G. R. Oliver, and thank him for having secured the promise of the Traffic Manager to discontinue these charges at Birur.

Santaveri Sunday Dispensary.—Correspondence read. The Honorary Secretary was instructed to write to the P. M. O. and request the services of an Assistant from Chickmaglur Hospital to visit Santaveri.

C. of M. P. A's.—Messrs. Denne, Hugonin and Kirwan were elected members.

District Board.—Read letter from the President of the District Board. *re* the abandonment of the Bababudin Hill Road from Miles 22—29. Read also Messrs. Denne, Johnson, Oliver and Courpalais letters on the subject.

Resolved: "That the Secretary be asked to write the President of the District Board, and say that this Association agreed that there was no necessity to repair the damaged portions of the road in miles 22—29, and that they might be abandoned." That this Association was of opinion that a road constructed from Kulhuttupur towards Hebby through the top portion of the Government Reserve Jungle would be of great service to the Forest Department as opening up the Lukavalli Jungles, and would be a great convenience to the estates on that part of the Hills, amounting to several thousand acres, which are at present without a Government road. The Association asks the District Board to give this matter their serious consideration.

Delegates to U. P. A. Meeting.—Messrs. G. R. Oliver and Kirwan were elected as Delegates. The U. P. A. agenda was discussed.

Manurial Experiments.—The Association were in favour of accepting the Kalisyndikat's offer, and the Delegates to the U. P. A. were instructed accordingly.

Labour Rates.—Mr. Urquhart's letter to the Honorary Secretary was read. The Honorary Secretary was instructed to write and thank Mr. Urquhart for this letter.

(Signed) N. G. B. KIRWAN,
Honorary Secretary.

Wynaad Planters' Association.

*Proceedings of a General Meeting held at Meppadi Club
on July 3rd, 1912.*

PRESENT.—Messrs. Dargin, Egan, Gillatt, Powell, Waddington, and C. E. Abbott, (Honorary Secretary.) *Visitor*.—Mr. Briggs. Mr. Waddington in the Chair.

1776. *The proceedings of last meeting* were confirmed subject to para. 1777.

1777. *Westward Ho Bungalow*.—Read correspondence relative to para. 1770 in last proceedings. The action of the Honorary Secretary in accepting Rs.2,500 for the bungalow is approved.

1778. *Non-Execution of Warrants*.—Reference para. 1769 in last proceedings. Read correspondence which is closed by a letter from the Deputy Inspector General of Police stating that under orders from the Inspector General of Police the proposal is to be held in abeyance pending further instructions.

1779. *Denudation of Tambracherry Ghaut*.—Read letter from Honorary Secretary to the Collector of Malabar and his reply, stating that the matter is being inquired into; and mentioning that the question is allied to that of the protection of the Head Waters of important rivers, and desiring the co-operation of the members of the Association in protecting the tree growth along the banks of all streams which traverse estates. Recorded. The Association will be glad to consider this matter in correspondence with the District Forest Officer. The particular danger that was referred to in para. 1771 last proceedings was that of heavy landslips on the Ghaut roads.

1780. *District Board Membership*.—Mr. J. C. Carson Parker has been appointed as representative of this Association.

1781. *The late Mr. Atzenwiler*.—Mr. Waddington informed the Meeting that Rs.295 had been subscribed towards a memorial stone over the graves of Mr. Atzenwiler and Mr. Punnett.

1782. *Coolies Contract under Act I of 1903*.—Read letter from Honorary Secretary, Nilgiri P. A., enclosing copy of judgment of the Coonoor Magistrate in a recent case. The Honorary Secretary was asked to make further inquiries.

1783. *Sale of bad grain and diseased meat*.—Read letter from Mr. Gillatt to Honorary Secretary, latter's letter to Mr. Cammiade, Deputy Collector, and his reply. The Meeting thanked Mr. Cammiade for his letter and resolved to act on his suggestion.

1784. *Employment of Military Pensioners*.—Read letter from Colonel Monck-Mason. The opinion of the Meeting was that the class of men likely to be employed in Wynaad would be pensioners from Native Regiments. Some members present said they were prepared to employ such men on special work on estates (factory watchmen, cart-drivers, gardeners, or assistant engine drivers.) The Honorary Secretary was instructed to write to Colonel Monck-Mason to the above effect.

1785. *U. P. A. S. I. Meeting*.—The Meeting approved of the date for opening the Meeting (August 12th) and gave instructions to the Delegate on various matters.

1786. *Cattle Nuisance*.—Proposed by Mr. Stewart, seconded by Mr. Gillatt, and carried unanimously: "That our Bangalore Delegate be asked to propose that Government be invited to take measures to abate the nuisance of cattle straying on the public roads uncontrolled to the danger of passengers."

1787. *Stray Dogs*.—Read G. O. 7614 dated May 17th, 1912 communicated by the President, Wynaad Taluq Board. Resolved: "That the Wynaad Planters' Association's representative on the Taluq Board be asked to support the proposal."

1788. *Date of next Meeting*.—This will be held on September 4th, 1912.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) H. WADDINGTON,
Chairman.

(„) C. E. ABBOTT,
Honorary Secretary.

TEA IN THE NETHERLANDS.

A Consular report on the Trade of the Netherlands in 1911 states:—

142,000 chests, averaging 40 kilos. of Java tea were imported into the Netherlands, and the stock of all kinds on December, 31, 1911, amounted to 2,726,500 kilos.

China descriptions fetched about 11*d.* per $\frac{1}{2}$ a kilo., duty paid (about 8*d.*), and Java kinds from 8*d.* to 9 $\frac{1}{2}$ *d.* in bond.

—o—

TEA OIL—WHERE DERIVED AND ITS USES.

An article for which, perhaps, a similar part is destined to that of the sesame seed—which, hardly known ten years ago, to-day occupies second place in the export trade of Hankow, China, and is fifth in the foreign commerce of that country—is tea oil. This oil is extracted from the oil-yielding tea shrub, or tea oil tree, a variety of the real tea plant the leaves of which yield the national beverage of the Chinese.

The seed, as large as a hazel nut, is located in round capsules, usually threefold. It is yellow inside, and covered with a brown shell. The clean, hulled kernels furnish an oil yield of 30 per cent., whereas, by expressing the raw nut about 20 per cent. can be obtained. Tea seed oil is pale yellow and has a more or less astringent taste. It belongs to the non-drying oils and in character resembles olive oil. The saponin substances it contains, which are not beneficial to human health, are destroyed by boiling. The oil is consequently used by the Chinese as a food oil. Its employment in domestic food supply industries is advocated. Soap manufacturers find in it a very good raw material, as it produces an excellent hard white soap. The presence of saponin is not detrimental, rather increases its lathering and washing power.

As a lubricating oil, this highly non-acid oil that is hardly subject to rancidity, is useful. The residue obtained from the pressing of hulled tea seed appears to be practically valueless. The shipment of tea oil from Hunan into the neighbouring provinces is quite considerable. The quantity possibly available for foreign export is as yet uncalculated. The principal producing locality is southern and north-western Hunan.—*Spice Mill*.

COFFEE.

The Market.

BY HENRY NORDLINGER & Co., NEW YORK.

[*Written especially for the Spice Mill.*]

New York, May 6.—The continuation of heavy receipts at Santos caused some uneasiness among the smaller bulls and, likewise, encouraged renewed activity on the part of bears.

The current Santos crop, which had, heretofore, been generally estimated at nine and one-half million bags, now looks as if it will reach 10 million bags, while the estimates of the growing Santos crop of seven to eight million bags have not been changed.

The Santos market continues to rule firm, considerably above the prices ruling in consuming markets, which indicates that holders there are confident of realizing higher prices later on, despite the close approach of the new crop movement.

The withdrawals for consumption in Europe and the United States exceed those of a year ago by about 230,000 bags, showing no curtailment in the consumption as compared with last year. This feature is of the utmost importance, because it shows that prevailing prices do not interfere with the consumption of the article.

The mild coffee crops, as judged by the arrivals of these kinds of coffee in Europe and the United States, show some increase over last year's production. Nevertheless, prices hold firm, especially at points of production, on account of the comparatively small quantity left there.

The marketing of these crops has, this year, taken place at steadily advancing prices, and has not been influenced in the least by the fluctuating experienced in the speculative market.

Wessels, Kulenkampff & Co., Coffee Importers, New York, in their circular of May 1, say of coffee:—

The fact that holders of coffee in Brazil are showing no anxiety to force sales in the face of liberal receipts proves better than anything else that the leading authorities there are still believers in a very small coming crop. The reports which we received lately confirm earlier estimates of less than 10 million bags during 1912 to 1913 for Rio and Santos. We do not look for important changes in the situation during the current month, but remain believers in higher values later on.

Aborn and Cushman, Coffee Brokers, New York, in their review dated May 3, say:—

The decline in option values and in the demand for coffee, has had the effect of making prices on spots lower, with market still easy. Sellers are now anxious to meet buyers, putting their best foot forward, as to quality and prices. The claim is advanced that the increased Santos receipts were due to a need of coffee, to deliver on term sales in Santos. The value of this explanation will be more apparent to the trade when the predicted perpendicular decline in receipts is really a fact. . . . A curious phase of the whole situation is the seemingly complete absence of anything that resembles confidence, either in the minds or operations of the whole trade. A few, close to the powers that be, are whistling loudly, but the general trade apparently never lose sight of a distant graveyard. . . .

Milds:—Maracaibos are still prime value. Bogotas show a trifle easier basis.

At Havre.

A Consular report states :—

The movement at the Havre docks in 1911 was as follows :—

Brand.	Imports.		Cleared.		Stocks.	
	1910. Sacks.	1911. Sacks.	1910. Sacks.	1911. Sacks.	1910. Sacks.	1911. Sacks.
Brazil ...	841,946	568,720	1,071,773	800,024	2,125,911	1,894,607
Hayti ...	330,319	242,284	236,037	265,384	150,421	127,321
West Indies and Central America ...	329,147	312,046	289,325	373,321	217,451	156,176
India, Java & Malabar ...	67,493	75,798	57,266	77,080	65,209	63,927
Africa & other countries ...	26,683	28,724	29,532	30,339	19,786	18,171
Total...	1,595,588	1,227,572	1,683,933	1,546,148	2,578,778	2,260,202
Unloading...	...	...	...	...	72,185	86,800
Grand total ...	...	...	...	...	2,650,963	2,347,002

The imports of coffee *via* Havre in 1911 show a decrease of about 370,000 sacks as compared with 1910. This applies almost entirely to the Brazilian coffee (decrease of 273,000 sacks) and the Hatian coffee (decrease of 88,000 sacks). The crops in Brazil and Hayti having been much smaller in 1910-11, the exports from these countries to this port, as well as to other ports, could not but decrease this last year.

The production of coffee shows the following amounts since 1903 :—

Season.	Brazilian Production. Sacks.	Production of other Countries. Sacks.	Total World's Production. Sacks.
1903—04 ...	11,101,000	4,891,000	15,992,000
1904—05 ...	10,523,000	3,923,000	14,446,000
1905—06 ...	10,844,000	3,948,000	14,792,000
1906—07 ...	20,190,000	3,596,000	23,786,000
1907—08 ...	11,001,000	3,861,000	14,862,000
1908—09 ...	12,912,000	4,003,000	16,915,000
1909—10 ...	15,324,000	3,801,000	19,125,000
1910—11 ...	10,848,000	3,676,000	14,524,000

The Brazilian production is divided amongst the different exporting ports as follows :—

Season.	Receipts at Santos. Sacks.	Receipts at Rio. Sacks.	Receipts at Bahia and Victoria. Sacks.	Total. Sacks.
1903—04 ...	6,395,000	4,020,000	685,000	11,101,000
1904—05 ...	7,426,000	2,542,000	555,000	10,523,000
1905—06 ...	6,983,000	3,244,000	617,000	10,844,000
1906—07 ...	15,392,000	4,234,000	564,000	20,190,000
1907—08 ...	7,203,000	3,108,000	690,000	11,001,000
1908—09 ...	9,533,000	2,883,000	496,000	12,912,000
1909—10 ...	11,495,000	3,449,000	380,000	15,324,000
1910—11 ...	8,110,000	2,438,000	300,000	10,848,000

The quotations which were at 70 fr. for good average Santos at the commencement of the year and at 74 fr. about January 15, declined sharply to 61 fr. in February, in consequence of heavy realisations by the bulls. Starting at 45 fr. on July 1, 1910, they rose considerably, in fact 70 per cent. within the space of six months.

The Committee of Valuation announced, as early as January, the sale of 1,200,000 sacks of coffee of the Government of the State of Sao Paulo for the month of April, of which 600,000 sacks in Europe and 600,000 sacks in the United States. These 1,200,000 sacks were sold on two occasions: 600,000 sacks on April 1 and 600,000 sacks on April 22. Prices remained them for some time at about 65 fr.

The information regarding the next Brazilian crop (1911-12) was rather contradictory. It was to be rather large according to some and rather small according to others. Unfavourable weather at the blossoming time and rainfall at the time of harvest considerably diminished the yield. Under all these unfavourable influences for production, prices did not fail to rise, and the upward tendency continued until October, when the price of 90 fr. was reached.

Then the big bulls began to realise, so that the good average coffee at the end of the year only cost 80 fr. The fall was further accentuated in January, when 74 fr. was dealt at and quoted, but the information concerning the next Brazilian crop became still more unfavourable, and prices have risen considerably. To-day (March 6) we are at 84 fr. for current and 81 fr. 50c. for September.

700,000 sacks of coffee of the valuation have been sold in February, of which 115,000 sacks came to Havre. The valuation stock to-day is only 4,408,000 sacks, of which 1,410,000 sacks are stored in Havre.

The out-goings from our port show again a decrease from the previous year. The diminution is actually of 270,000 sacks in the Brazil coffees as against an excess of 130,000 sacks in the other coffees. The deficit in the out-goings of the Brazil coffee is due in part to the amounts for home consumption and in part to re-exportation.

The following have been the amounts for consumption in France since 1905:—

		Total Quintals.	Of which Brazilian Quintals.
1905	...	909,855	449,266
1906	...	978,431	498,883
1907	...	1,015,697	535,130
1908	...	1,027,619	563,875
1909	...	1,079,420	639,172
1910	...	1,118,276	662,958
1911	...	1,110,510	571,707

In the Netherlands.

A Consular report on the Trade of the Netherlands in the year 1911 states:—

The arrivals in the Netherlands amounted to 1,871,085 bags against 1,445,200 bags in 1910 and deliveries to 1,704,614 bags, leaving a stock of 614,583 bags on December 31, 1911. Prices for good ordinary Java ranged from £3, 15s. 4d. to £4 6s. 4d. per cwt., which was the closing rate, and Santos fluctuated from £3 1s. 10d. to £3 16s. 2d. per cwt., closing at £3 11s. 1d. per cwt.

RUBBER.

Brazilian Legislation going into Effect.

“OBSERVER” writes in the *India-Rubber World*:—

It is satisfactory to note that the Government of Brazil means business. The provisions of the new law (a full extract of which appears in this issue) are not being allowed to lie dormant.

Two-thirds of the surveys connected with the proposed new railways will be finished by June 30, and the completion of the surveys will follow shortly afterwards. It is understood that the Government is prepared to spend the equivalent of about 92,000,000 on the new lines, intended for the development of rubber cultivation.

A company is said to have been organised at Bahia (with the co-operation of English capital) for the purpose of establishing a rubber goods factory at that point, under the encouragement afforded by the new measure.

With a view to improving the conditions of rubber cultivation, the Brazilian Government is said to be importing a large number of drills of American manufacture. Experts in their use accompany the drills which are intended for the boring of artesian wells. The Government is taking steps to distribute these drills among the various plantations standing in need of them.

New Brazilian Legislation.

An examination of the text of the new Brazilian law as approved on January 5 by the President, shows it to be a carefully formulated measure, covering rubber in all stages of importance from the soil to the outgoing steamer. These provisions made by considered under the heads of those directly referring to rubber and those bearing upon conditions more or less accessory to its cultivation by their influence upon the cost of production.

A—CULTIVATION.

That the high cost of producing rubber in Brazil is due to the excessive cost of living and transportation, has been pointed out by various leading authorities, and it is to these points, as well as to the direct promotion of rubber cultivation that the new legislation is directed. One of the principal objects in view being economy in cultivation, the exemptions provided by the first article of the bill form an appropriate introduction to its subsequent provisions. This clause provides for the free admission of all utensils and materials intended for the cultivation of *Hevea*, *Caucho*, *Manicoba*, and *Mangabeira*, as well as for the collection of customs and preparation of rubber extracted from those trees. Rapidity of customs procedure is enjoined by the bill.

Another feature of the encouragement of rubber cultivation, under the new legislation, is the establishment, by Article 2, of prizes for successful planters, in two broad divisions—newly cultivated and replanted lands.

In the former class they are graduated as follows, per group of twelve hectares (30 acres):—

	Milreis.
<i>Hevea</i> ... ..	... 2:500 = \$833 gold.
<i>Caucho or Manicoba</i> ...	... 1:500 = \$500 gold.
<i>Mangabeira</i> ... ..	... 900 = \$300 gold.

In the latter class they are graduated as follows, per group of twenty-five hectares (62½ acres):—

	Milreis.
<i>Hevea</i> ... ..	... 2:000 = \$667 gold.
<i>Caucho or Manicoba</i> ...	... 1:000 = \$333 gold.
<i>Mangabeira</i> ... ..	... 720 = \$240 gold.

These prizes may be claimed one year before the first crop, upon verification of the ground having been fully improved and the trees properly treated. A yearly increase of 5 per cent. since period of planting is added to in the value of the prizes where the planters can prove the parallel cultivation throughout their property of plants of industrial or elementary utility.

Recognizing the importance of the training and instruction of planters, provision is made upon that subject in Article 3.

The Government is to establish at a point selected for the purpose, an experimental station, or camp of demonstration, for the cultivation of *Hevea* in the Territory of Acre, and in each of the States of Matto Grosso, Amazonas, Pará Maranhao, Piahy and Bahia; as well as for the cultivation of *Manicoba*, in conjunction with that of *Mangabeira*, in each of the States of Piahy, Ceará, Rio Grande de Norte or Pernambuco, Bahia, Minas Geraes, S. Paulo, Goyaz, Parana and Matto Grosso.

These stations will furnish gratuitously to all interested persons asking for them, selected seeds, with instruction as the most practical and economical method of cultivation.

B—EXPORT DUTIES.

Relegated from its original position in the bill under old Article 4, the question of the modification of export duties is treated in a new article—12—in the following terms:—"The Executive Authority is empowered to enter into agreement with the States of Pará, Amazonas and Matto Grosso, with the object of attaining a yearly reduction of 10 per cent. up to the maximum limit of 50 per cent. of the present amount of export duties collected by the States upon the *Hevea* rubber produced in its territories, and exempted from all export duty for the term of twenty-five years, counting from the date of this law, of rubber of the same quality and origin collected from cultivated plantations."

"As soon as this agreement has been made, the Executive authority will issue a decree, applying the reduction made by the said States to the export duty collected on rubber from the Federal Territory of Acre, and conceding like exemption as to cultivated rubber."

C—RUBBER REFINING AND MANUFACTURE.

The above objects are provided for in new Article 4 under separate heads. A premium up to milrises 400:000 (\$130,000) will be awarded to the first *Hevea* refining plant which shall, reduce the different qualities to a uniform and superior export type, and which shall be established in each of the cities of Balem (Pará) and Manaos. As premium equalling \$33,000 gold will be awarded the first plant for refining both *Manicoba* and *Mangabeira* rubber, to be established in each of the States of Piahy, Ceará Rio Grande de Norte, Pernambucc, Bahia, Minas Geraes and S. Paulo.

Encouragement is afforded for rubber manufacturing by a provisions for a premium up to milreis 500:000 (\$160,000 gold) to the first plant for manufactures of rubber to be established in Manaos, Belem (Pará), Recife, Bahia and Rio de Janeiro. In order to be entitled to the favour specified in this article, it is necessary for the factory to have paid up capital equalling four times the value of the premium.

D—TRANSPORT.

The above are the provisions directly bearing on the rubber industry. There are accessory conditions which are dealt with in other article provi-

ding for the new railways and improved river navigation necessary to facilitate and cheapen transport. Under Article 6 it is provided that :—

“ In order to facilitate transports and to diminish cost of same in the Amazon Valley, the Government will get executed within the shortest time possible the following improvements and supplementary measures :—

1. Construction of narrow gauge railways along the rivers Xingu, Tapajos and others, in Pará and Matto Grosso, and the rivers Negro, Branco and others in Amazonas, and penetrating into the valleys washed by them; by public competition in accordance with the law of December 13, 1903, or at a rate per kilometer, according to the judgment of the Government and the difficulties presented by the region.

In case of the States of Pará and Amazonas having contracted for the construction of any of these lines, the Government, for the more rapid completion of the work, will grant them an increase of 15 cantos per kilometer (\$8,000 mile).

2. Construction of a railway starting from a convenient point on the Medeira and Mamore line, near the mouth of the river Abrina, passing through Villa Rio Branco, and through a point between Senna Madureira and Caty; ending at Villa Thamaturgo, with a branch to the Peruvian frontier, through the valley of the river Purus.

The construction of this line will be in accordance with the regulations of the law No. 1,126 of December 13, 1903.

As soon as the first section of the trunk line is completed as far as Villa Rio Braneo the Government will establish a Custom House at Porto Velho on the river Madeira, and will declare that port open to the commerce of friendly nations.

3. Construction of a railway starting from the port of Belem (Pará), and connected with the railway system at Pirapoa, State of Minas Geraes, and at Coroata, in the State of Maranhao; with the branches necessary to connect the initial or terminal points of navigation of the Rivers Araguaya, Tocantins, Parnahyba and S. Francisco.

This railway will be constructed under the regulations of the law of December 13, 1902, and the construction awarded by public competition.

4. The necessary works will be executed for rendering navigable at all seasons of the year for vessels of certain draught:—the river Negro, between Santa Isabel and Cucuhy; the river Branco, between the mouth and the fort of S. Joachim; the River Purus, from Hyutanahan to Senna Madureira, and the river Acre, from the mouth to Riosinho das Pedras.

The Government can contract for the execution of the above works by means of public competition or independently of competition, with one or more suitable concerns, applying the regulations of the decree No. 6,368 of February 14, 1907.

Such are the plans for improved transportation by rail and river; materials and machinery for the improvement of navigation being free from import duties under Article 7.

Similar exemption will be conceded under Article 8, to concerns which, in public competition, will bind themselves to establish depots of coal at a point in the Amazon valley previously indicated, for the purpose of supplying coal to steamers and launches at prices approved by the Government.

The Planters' Chronicle.

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JULY 27, 1912.

[PRICE AS. 8.]

THE U. P. A. S. I.

(INCORPORATED.)

The Secretaryship, &c.

It is understood that Mr. Fletcher Norton will assume charge of the Secretaryship of the U. P. A. S. I., and will also take charge of this paper, on the 3rd August, 1912. The present Office and Laboratory premises are to be taken over from Mr. Ormerod.

The Annual Meeting.

A complete list of delegates has yet to be received. Hony. Secretaries of District Planters' Associations are requested to be good enough to give prompt attention to this matter.

ROADS AND COMMUNICATIONS.

The Shevaroy Planters' Association has given notice of its intention to move the following resolution at the Annual Meeting :—

"That Government be asked through the U. P. A. S. I. if they will hand over the Ahtoor Ghât Road to the I. P. R. and Tea Estates Co., Ltd.—whether they will grant an allowanoe towards the repairs—if so how much, and also whether the Company would be allowed to fix their own Toll Gate."

Planting Member of Council.

The general election for the Madras Legeslative Council is likely to be held about November next, and planters will be called upon in due course to elect a representative.

The S. I. P. B. F.

Mr. Ormerod relinquished charge of this Fund on the 17th instant, and made over to the Chairman certain remittances that were in hand. This has delayed for a short time the issue of formal acknowledgments in these cases.

The U. P. A. S. I. Exhibition.

Reminders have been sent out concerning the Exhibition that is to be held in connection with the Annual Meeting that will open on the 12th Proximo. It is intended that the Exhibition should be arranged at the Office premises, as before. Mr. G. N. Frattini will probably be in charge, assisted by a small Committee. Exhibits should be addressed to the Secretary, U. P. A. S. I., and if despatched by rail should be booked to Bangalore Cantonment Station.

A coffee pulping machine, in work, is likely to be one of the chief features of this year's show.

Destruction of Bees.

G. O. No. 2062 Mis., dated 11th instant, has been communicated to the Association by the Secretary to the Government of Madras, Revenue Department. It reads as follows :—

“Recorded,

“2. The further report promised by the Director of Agriculture is awaited.”

[INCLOSURES.]

*Copy of Proceedings from the Board of Revenue, Rev. Sett. No. 1088
Mis. dated 28th March, 1912.*

Read the following papers:—

I

Endorsement from Government Revenue Department.

Dated 18th December, 1911.

No. 3,000 3/11-1.

II

Reference from the Board of Revenue, Revenue Settlement.

Dated 3rd Jaunary, 1912.

No. 13—

Referred to the Director of Agriculture for remarks.

III

Letter from G. A. D. Stuart, Esq., I. C. S., Director of Agriculture.

Dated 11th March, 1912,

District No. 517.

In reply to Board's Reference No. 13, dated 3rd Jaunary, 1912 I have the honour to submit the following remarks :—

2. The Government Botanist and Mr. Fletcher, the future Madras Entomologist, whom I have consulted inform me that it has by no means been proved that bees are essential for the pollination of coffee. It would be possible to test this by a few simple experiments and I am asking Mr. Fletcher to arrange to carry these out.

3. If it is proved that wild bees play an important part in the pollination of coffee, then it would certainly be advisable to prevent the destruction of bees, if possible. I was doubtful myself whether the destruction of bees by the native honey and wax collectors causes much serious decrease in the number of bees. The Planting Expert, however, informs me that many planters have assured him that there has been a serious diminution in the number of bees in planting districts in recent years. I think that it would, probably, be extremely difficult to induce the jungle tribes who at present collect honey and wax to change their methods. It would be impossible to control them. Nothing but the absolute prohibition of honey and wax collection would have much effect. Even this would be very difficult to enforce and the planters state especially that they do not want it. However, if Mr. Fletcher's experiments show that bees are essential for the pollination of coffee, I will ask him to enquire and report on the possibility of reforming the native method of honey and wax collection.

4. The true solution of the problem appears to be that the planters should keep their own bees and should prevent any destruction of wild bees on their estates. Mr. Fletcher has experience of bee-keeping at Pusa and will be asked to investigate the problem of the keeping of hive bees in the planting districts of Madras.

5. The enclosures in original are returned.

Resolution.—The letter from the Director of Agriculture read above is submitted to Government with reference to their endorsement No. 3,000 E/11-1 Rev. dated 18th December, 1911.

2. The report promised by the Director of Agriculture in paragraph 3 of his letter will be submitted to Government on receipt.

Copy of Proceedings from the Board of Rev. Rev. Sett. No. 2217 Mis. dated 27th June, 1912.

Read the following paper :—

Letter from G. A. D. Stuart, Esquire, I.C.S., Director of Agriculture, Madras.

Dated 13th June, 1912.

No. Dis. 1272.

Referring to your reminder dated 8th instant on B. P. No. 1088 Mis., dated 28th March, 1912 and my letter Dis. No. 517, dated 11th March, 1912, regarding the possibility of reforming the native method of honey and wax collection, I have the honour to report that, as the new Entomologist joined his appointment in this Presidency only on 24th April last, by which time the flowering season of coffee was over, the report promised in my letter dated 11th March, 1912 can only be submitted in a year's time after the Entomologist's investigation into the matter in the next season.

Resolution.—Recorded.

Indian Railway Finance.

Writing on the 5th instant the Secretary, Karachi Chamber of Commerce, remarked :—

"I am directed to enclose herewith for the information of your Chamber a copy of a representation made by this Chamber on the 1st instant to the Government of India on the subject of providing adequate financial resources for the further development and equipment of the Indian Railways.

"My Committee hope that if your Association finds itself in agreement with the representation now made, that your Committee will be able to see their way to give this representation their most valued support,"

[INCLOSURE.]

Five years ago an Indian Railway Finance Committee was appointed by the Secretary of State for India to enquire and report on, among other matters, . . . "whether the amounts allotted in recent years for railway construction and equipment in India were sufficient for the needs of the country and for the development of its trade; and if not, what additional amounts might properly and advantageously be raised for this purpose." . . .

2. The Committee reported that the equipment of Indian Railways had *not* been equal to the requirements of trade, and they suggested that

the allotments for railway construction and equipment should be increased beyond those of the preceding year. Their specific recommendation was . . . "that the programme of annual expenditure on railway construction and development in India be for the present fixed at £13,500,000 equal to £100,000,000 in the next eight years." . . .

3. My Committee notice that notwithstanding the above recommendation (which was heartily welcomed by the commercial community in India), the Secretary of State has never yet provided in full the annual sum recommended by the Indian Railway Finance Committee. The reason for this not very clear to my Committee, but they assume an explanation is perhaps to be found in the inability of the Secretary of State or the Government of India to borrow from the public all the capital sums that the Railway Board required, on such terms as Government wanted, *i.e.*, on terms that Government considered satisfactory, looking to the urgency and importance of the Railway Board's demands as compared to the requirements of other Departments and of the position of Government's loans generally.

4. Last year the sum provided was £8,500,000; whilst for the current year (1912-13) the total allotment to the Indian Railways is only £9,000,000 of which it is understood practically the whole is to be devoted to existing lines, and lines the construction of which has already begun; so that practically nothing remains for the construction of altogether new railways.

5. In the meantime not only have the population, industries, and general trade of the country grown more rapidly than the ability of the existing railways to deal with the traffic, thus producing delays, congestions and hindrances to transport highly inimical to the interests of cultivators, merchants, exporters and all trade interests concerned; and further developments in the shape of new railway undertakings are now practically left entirely to the emergency, foresight and enterprise of private interests.

6. My Committee view this situation with feelings of the gravest concern. Unless something be done immediately to recover the lost ground consequent upon Government's failure or inability to give practical effect in full to the recommendation of the Indian Railway Finance Committee of 1907, the complexities of the present situation must of necessity multiply, and progress of the country be materially checked.

7. The crux of the whole difficulty appears to my Committee to be a financial one. More capital is urgently needed, and the problem is—whence can this further supply of capital be obtained? In this connection my Committee venture to submit the following remarks to which they beg that Government will give consideration.

8. There seems to be only one source upon which Government can regularly depend for the supply of capital necessary for the better equipment and further development of India's railways, and that is loans from the public (in England or India.) Surplus revenue might, my Committee think, be applied wholly or in part—according to the emergency of the case—to the development of railways; but this source of supply is not to be relied upon with certainty, and can only be utilised from time to time when, and to such degree, as the circumstances of the moment permit. The further encouragement of private enterprise by the offer of five per cent. *Guarantee* in place of the present five per cent. *Rebate* terms would stimulate private activities to the construction of further branch or feeder lines; but here again the remedy could not be relied upon with certainty nor would

it, even if successful, do more than help to a small degree towards the improvement of the general railway position in India, which is the subject of this Chamber's present representation.

9. It appears to my Committee, therefore, that Government are forced to rely upon one chief source of supply—loans from the public. In this connection my Committee desire to lay special emphasis upon the present world conditions. At the moment—and probably for some years to come—commerce and industries are face to face with a general upward movement in the level of prices. This general upward movement of prices is giving a marked stimulus to all production and trade and bringing about an increase in the earnings of capital that has the result of depreciating the value of all fixed interests bearing securities. In such circumstances there is little or no probability of Government being able to borrow largely at $3\frac{1}{2}$ per cent. Indeed, my Committee fear that this rate of $3\frac{1}{2}$ per cent. will probably have to be regarded, for some time to come, as a thing of the past. The result of the recent India loan of £3,000,000 emphasises this point. In these circumstances my Committee consider that it will be in the best interests of India that these facts should be clearly recognised and that Government should face the situation and continue raising money freely at higher rates than $3\frac{1}{2}$ per cent. either by increasing the rate of interest or by offering India loans at a discount that will bring about the same result—a higher return to the investing public. My Committee most strongly deprecate any policy of delay on the part of Government until capital can be borrowed more cheaply. My Committee see no likelihood of cheaper capital in the immediate future, especially as my Committee believe that every British Colonial Government and many reliable Foreign Governments are prepared to pay better rates for capital than have hitherto been acceptable to the Government of India.

10. In the meantime money is urgently needed to bring India's chief railways up to a standard of efficiency adequate to the present demands of India's rapidly expanding trade. As a temporary measure, my Committee would urge the immediate utilisation of some of the Government of India's balances at present lying in London. My Committee notice that apart from the Gold Standard Reserve balance of nearly £18,000,000 (invested in London in British and Colonial securities), the Secretary of State holds on behalf of the Government of India over £17,000,000 in cash which in the absence of more profitable employment has been lent out in London to certain London Joint Stock Banks and others at rates approximating $2\frac{1}{2}$ per cent. per annum. My Committee beg to enquire if £3/5,000,000 of this money cannot be at once converted by book entry into an India Sterling loan for the immediate service of the Government of India in the interests of the Indian State Railways.

11. To summarise, my Committee are most strongly of opinion that the Indian Railway Finance Committee's recommendation of an annual grant of £12,500,000 should be acted up to in full; that if the Government of India are unable to obtain this sum from surplus revenue and loans at $3\frac{1}{2}$ per cent. then Government should at once face the situation and borrow at the market rate of the day, but on no account delay the railway construction in the hope of obtaining cheaper money at some future date; and lastly as a temporary measure, and in order to make up for the lost time, Government should utilise a substantial portion of their present £17,000,000 cash balance in London by converting £3/5,000,000 of it into an India Sterling Loan for the improvement and extension of Indian Railways.

Scientific Officer's Papers.

CV.—HYBRIDISATION OF PLANTS.

Since pollen is either insect or wind borne it must often happen that the stigma of one flower receives the pollen from a totally different kind of flower, but a fertile sexual union does not take place indiscriminately among plants. A certain relationship, or sexual affinity, must exist between the parent plants before their reproductive cells will unite. It is impossible to cross a Rose with pollen from a cabbage for instance, in order to obtain a fertile cross the pollen must come from the anthers of a Rose or some flower closely allied to a Rose. When the relationship between the male and female reproductive cells is too close, and also when it is too remote, fertility is reduced. For the production of the most vigorous and the most prolific progeny there must be a certain degree of difference between the reproductive cells which unite. The most fertile sexual union takes place between the reproductive cells of flowers which are borne on different individual plants of the same species. The seeds resulting from such a union produce plants which grow luxuriously and bear heavy crops.

Varieties of the same kind of plant also cross readily and the resulting progeny are known as *Hybrids*. Such variety hybrids usually possess the following characters:—

(1.) They are often more robust and luxuriant than their parents, the root system being more extensive and the leaves and branches larger.

(2.) They usually grow more rapidly, flower earlier and produce a larger number of flowers than the parents.

(3.) If the flowers of the parents are dissimilar in colour the flowers of the hybrid are mottled with a mixture of these colours.

This character is largely made use of by horticulturalists in producing flowers with variegated or new colours.

(4.) The power of seed production is stronger than that of the parents,

These characters are amply illustrated in the hybrids of Cotton, Wheat Tea, and Coffee commonly cultivated.

In the first generation raised from seeds obtained by cross pollinating different varieties or species all the individual plants are in most instances similar to each other and resemble both parents, their characters in regard to the form and size of root, stem, leaf, and flower, are approximately intermediate between the two. The individuals of the second generation, however, that is the off-spring which arise from self pollination or cross pollination of the flowers of hybrids vary very much in form and in other ways; they do not resemble each other nearly so much as those of the first generation. Some of them almost exactly resemble the female, others the male parent, while many show the characters of both parents combined in various degrees.

Moreover in many instances entirely new characters not seen in either parent arise among the off-spring of succeeding generations of hybrids.

The study of these facts has led to many valuable results and the characters of hybrids are found to follow a certain definite law known as *Mendel's Law*. The following popular account of this law and the work which led to its discovery appeared in '*The Popular Science Monthly*' of April last, in the course of an article on 'the Red Sunflower,' by Professor T.D.A. Cockerell:—

"During the sixties, Gregor Mendel, Pralat at Brunn in Moravia, experimented with plants, especially garden peas. He was the first to

appreciate the necessity of following up crosses for several successive generations, tabulating the results in each case, and ascertaining the numerical proportions of the differing forms resulting. He also took pains to consider the different sets of characters separately, treating them statistically as if they were different organisms. Working in this way, Mendel discovered that when two varieties are crossed the resulting hybrid is frequently not intermediate, but resembles one or the other parent. In other cases, when the hybrid, as a whole, seems intermediate, the several *characters* are nevertheless found to correspond with those of one or the other parent. When this sort of thing occurs, the character which comes uppermost in the cross is said to be *dominant*, the one which remains latent or hidden is called *recessive*. Inasmuch as fertilisation results from the fusion of the germ-cells of the two parents, it is evident that each individual hybrid must contain material derived from both, although only the characters of one parent may be visible. Now Mendel found that when hybrids obtained as described were crossed together in the next generation he got, in simple cases, three of the "dominant" type to one of the "recessive." Of course the proportions would not be always thus, but whenever the number of cases was large they approximated so closely to the three-to-one ratio, that he became convinced that this was no accident. A simple theory was formulated, according to which the results arose from the chance combination of the elements in the germ-cells. We may now make this clearer by a diagram in which D stands for the character which is dominant, R for that which is recessive.

First cross, DD x RR.

"This is written DD and RR, not simply D and R, because we are supposing that each individual is pure for the character involved, that is, has received D or R from each parent.

"First filial generation DR x DR x DR x DR, as many as there may happen to be. These are written DR because each gets D from one parent (which has nothing else to give) and of course R from the other. Now in the next generation each parent contributes, not its whole "DR," but one or the other, according to the laws of chance. Accordingly, DR x DR may produce a DD, or a DR, or a RR and as a matter of fact, they do so. Why should there be any particular numerical proportion? If we put black and white balls in a bag, and draw them out in pairs at random, the chances are equal that we shall get two alike, or two different. It is so with our crosses. The cases in which we get two alike may be of two kinds, both black or both white, or in the case of the crosses, both D or both R. The cases in which we get two different are necessarily alike, black and white, or D with R. Hence according to the law of chance, we expect in the third generation the following:—

1. Both alike, DD and RR.
2. Not alike, DR and RD, which are the same.

Now we have seen that because of dominance R does not show when D is present, so that a DR looks like a DD. Consequently, of the above four cases, *three* show the dominant character, and *one* (RR) shows the *recessive*. The whole diagram may now be reconstructed:—

1. DD x RR (original cross).
2. DR x DR x DR x DR (first filial generation).
3. DD x DR x RD x RR (second filial generation, or grand-children).

How can this be confirmed? Obviously, if the facts are as here given, the DD and the RR of the third line are now *pure*, in spite of the fact that the

DD had an RR grandparent and a DR parent, and the RR a similarly complicated ancestry. Take a number of these pure types, now called "extracted recessives" and "extracted dominants," and breed them separately, the DDs with DDs, and the RRs with RRs, and they *will breed true*, and their descendants will for ever remain true, unless contaminated by a cross or some new variation arises. The DRs, however, when bred together, will again produce the "three-to-one" results, just like their parents. Consequently, it is possible to extract a pure strain out of an impure one, a fact of tremendous scientific and practical importance."

RUDOLPH D. ANSTEAD, *Planting Expert.*

THE INDIAN AGRICULTURIST, MARCH 1, 1912.

One of the most valuable of recent contributions to the "Memoirs" of the Department of Agriculture in India has been issued in the form of a fairly bulky volume on the Food of Indian Birds. The enquiry was carried out by Mr. C. W. Mason, lately Supernumerary Entomologist, Imperial Department of Agriculture, and its final object was to elicit definite facts regarding the influence, beneficial or otherwise, of birds as a whole, and of each common bird. Though apparently it has been limited to local observations round Pusa, the enquiry has been very exhaustive, and its results may be taken to apply generally to the whole of India, inasmuch as, in Mr. Mason's words, in all probability "foods of widely distributed species differ but little in different localities." It is, therefore, of great interest to learn from the brief summary of the enquiry which Mr. Maxwell-Lefroy contributes to the Volume, that "in the main the birds common in Pusa are, from our point of view, beneficial," inasmuch as they assist the agriculturist by the destruction of harmful insects. Coming to details, there is a difference of opinion between Mr. Maxwell-Lefroy and Mr. Mason in regard to the crow. Mr. Maxwell-Lefroy would protect the crow, because it feeds on *Chrotogonus*, the very destructive grass-hopper, though "eight of the specimens dealt with ate frogs." Mr. Mason, on the other hand, says, that "crows cannot definitely be classed as beneficial, and require, if anything, to have their numbers kept within certain limits." But there is no doubt about the value of the King Crow, which is described as "a most important bird—far more so than the records seem to show," says Mr. Maxwell-Lefroy.

—:0:—

AMSTERDAM COFFEE MARKET IN 1911.

A British Consular report states:—

The past year was a most prosperous one for the coffee trade. The price of good average Santos rose steadily from 23 to 36½c. per Dutch lb. during 1910, but in October, 1911, it suddenly rose to 45c., a figure which has not been reached since 1896. The cause of this extraordinary rise is to be attributed to the unfavourable reports regarding the 1911-12 and 1912-13 crops that have reached Europe.

Sales of coffee were considerable during the past year. The Dutch market was well supplied by arrivals from Santos for the Netherlands Trading Company, which sold 476,042 bags during 1911. . . .

765,699 bags of Santos coffee arrived at Amsterdam during 1911, of which the Royal Dutch Lloyd Steamship Line brought 543,911 bags direct from Brazil.

The use of coffee substitutes, chiefly coffee adulterated with chicory and roasted beans of various kinds, is increasing considerably in the Netherlands, probably in consequence of the rise in price of coffee berries.

CORRESPONDENCE.**Carbonic Acid Gas as a Coagulator.**

Dear Sir,—With reference to your remarks in your issue of 25th May, concerning Dr. Pahl's claim to coagulate latex with carbonic acid gas, you may be interested to know the Chemists of the Rubber Growers Association in London (Malay Section) state in their 10th report—

“Carbonic acid gas does not coagulate latex—this is of interest in
“reference to Pahl's process—coagulation with carbonic acid gas
“under pressure.”

Chippenham, 16th June, 1912.

(Sd.) BASIL S. CHAS. H. HANKEY.

Lime in Heavy Soils.

Sir,—The Quarterly Journal of the Indian Tea Association says that a lime containing carbonate will not have the same beneficial results on heavy soils as will lime which is free from carbonate. How is a poor planter to discriminate between the qualities of lime?

Perhaps our ever obliging Scientific Officer would kindly suggest some simple methods of judging of the quality of lime.

NILGIRI PLANTER.

TEA IN FRANCE.

A Consular report on the Trade of Havre in 1911 states :—

The importations of tea at the port of Havre came to 2,187,360 lbs. in 1911, which showed an increase of 126,180 lbs. over the previous year. This increase is due to the importation by foreign firms who left a fair proportion in dépôt or re-exported a further quantity. The French consumption of tea is still small and develops slowly.

The following table shows the imports and exports of tea during the last four years :—

			Imports.	Exports.
			Lbs.	Lbs.
1908	...	...	1,415,319	204,892
1909	...	...	1,667,106	154,934
1910	...	...	2,061,180	361,176
1911	...	...	2,187,360	339,460

The details of tea imported during 1910 are as follows :—

From—			Lbs.
United Kingdom	...	...	42,020
British India	...	...	552,420
China	...	...	821,920
Indo-China	...	...	637,680
Other countries	...	...	7,140
Total	...	...	2,061,180

14,690 lbs. of tea was imported from the United Kingdom during 1911.

TEA.

New Season's China Tea.

After the disconcerting rumours of the last month or two anent the new season's crop of China tea—that the disturbed state of the country would prevent money being sent up to finance the growers, that the tea could not be brought down, that it would certainly be 30 per cent. or some said 50 per cent. short, that it would be greatly delayed, etc.—the fact now is that the business-like Chinaman has found other means to get his teas and finance them. We now know that the Hankow crop is a full one, that prices are higher than last year owing partly to the rise in silver, the higher rate of exchange, and also partly to the fact that the Russians have bought freely. We have already seen a good many samples of the new tea, and we think the first crop will prove a good one as regards quality and colour in cup, but that the leaf is not so good. Costs, however, are too high, and one cannot yet tell how much is coming to London. Anyhow, tea is coming here, but it is probable that it will come in dribblets, and the first arrivals will be here, about the same time as last year. Finest grades are very short, but medium and common first crop is in full supply.

Despite the fact of the first crop being a full one, it does not follow that a large quantity is coming to this market. Until Russia has supplied her wants, prices may not come down sufficiently to induce buyers from this side to send out large orders; hence the reason we suggest that teas will come forward slowly. The news from Foochow is very meagre. Prices asked for the best Panyong and Ching Wos are very high, and no sales are reported—in the face of the recent forced sales of one of the best crops of Panyong we have seen of late years, at very low rates. No one in his senses is likely to operate in the new crop at quotations now being received. The first arrivals from Foochow must be several weeks later than last year. There is still a fair amount of good medium and fine tea left of the present season, which will keep the trade going for some time to come, and unless importers can sell their new teas at reasonable prices, we are afraid they will come to a very slow and dragging market. Anyhow, the reception of the new crop will be cool, and buyers will act with caution, until they find they have reason to alter their opinion and tactics.—*The Grocer*.

British Grown Tea in Europe.

The consumption of British-grown tea on the Continent of Europe is declining, notwithstanding the propagandist efforts of the last few years. The "Financial Times," in an article on the subject, says that the Continent consumes $\frac{3}{4}$ oz. per head per annum as against the 88 oz. consumed in the United Kingdom. Whether China and Java are supplying the Continental tea drinker, or whether tea-drinking is falling away rather than increasing, there is, unfortunately, nothing to show. Evidently there is ground here for inquiry. "The conclusion is," says the "Financial Times," "that something totally different from what has been hitherto tried is required. What that constitutes the problem to be solved, for it is not to be supposed that anyone connected with India will cease to believe in the possibility of converting some of these teeming European populations into tea-drinkers, however great may be the discouragement at the moment, nor is it reasonable to ask home contributors to depute the direction of the work to others." It would be extremely interesting, alike to the planter and the trade, to know what is wrong. Having discovered that, the situation might be dealt with. At present everyone is in the dark.—*Rubber World*.

RUBBER.

Plantation Crop Prospects.

The rapidly increasing supplies of plantation rubber are awakening fresh interest, not only among investors, but merchants and manufacturers in Europe. The increase from 500 tons for the whole of the year 1906 to one of over 500 tons every fortnight at the London Auction rooms seems to, at last, have had some definite effect on the minds of sceptical observers. We now frequently hear of many persons, who, up to recent times, looked askance at our predictions, openly acknowledging that the plantation industry has a backbone, that the crops are likely to have a marked effect on prices and consumption, and that the new source of supply in the Middle East is going to oust the two principal areas—tropical America and Africa—in point of quantity, quality, and even cash value.

At a recent lecture given at the Imperial College of Science, London, the writer showed that whereas Brazil required an interval of 30 years to raise its output from 31 to 1,800 tons, the Middle East, commencing with an export of 500 tons in 1906, turned out 14,000 tons last year. On the other hand, Brazil took from 1827 to 1887—60 years—to increase its export of rubber to 13,300 tons. During the present year—1912—we predict that the supplies of plantation rubber from the Middle East will be from 22,000 to 25,000 tons, this of pure rubber losing less than one per cent. from port of shipment to the manufacturers' rollers. Last year Africa produced 22,000 tons of rubber, many grades of which lose 20 to 40 per cent. in purification by manufacturers. It is, therefore, quite clear that the plantation crops for 1912 will exceed by a considerable amount the maximum yield ever obtained from the whole of the African continent. Hitherto Africa has supplied about 25 per cent. of the world's crop, and the East only 10 to 15 per cent., made up of wild and plantation sorts. Henceforth the Indo-Malayan region will stand before Africa in point to production.

When then, will the plantation supply exceed that from tropical America of Brazil? The success for 1912 is only the fore-runner of a much more substantial one. Plantations should, within two years, actually produce more caoutchouc than the maximum crop from Brazil ever gave us. Take the Brazilian crop at 40,000 tons, and allow for a loss on washing of from 10 to 20 per cent., and you will see that the anticipated crop of 35,000 tons of plantations for next year or 1914 will easily come first.

In 1906, at the Ceylon Rubber Exhibition, the writer pointed out that the yield from the acreage then planted—250,000 acres—in the East would in about six years (1912) yielding at the rate of $1\frac{1}{2}$ lb. per tree, give 25,000 tons. That same acreage will give a higher yield when one year older; new acreages planted in 1907/, and 1908 will also be in bearing next year, and a crop of 35,000 tons should, therefore, be obtained for 1913.

It is quite an easy matter to calculate the probable future crops from plantations from the statistics given in the 4th Edition of Wright's "Pará Rubber," now published. If Ceylon, South India, and East Java are assessed at one ton per ten acres, and Malaya and Sumatra at one ton per five acres for trees seven years old and over, a fair estimate can be arrived at. We advise all whom it may concern to study the acreage statistics mentioned, and compile their own estimates of crops.

A few figures of planted acreages for particular years are here given:—

	Ceylon.	Malaya.
1897	650	350
1902	4,500	7,500
1905	40,000	38,000
1906	100,000	99,230
1907	150,000	179,227
1908	170,000	241,138
1909	174,000	292,035
1911	220,000	400,000

To these must be added 80,000 acres of Hevea in Sumatra, 160,000 acres in Java, half of which is Hevea, 42,000 acres in South India and Burmah, and fair-sized plantations in Borneo, German Colonies, and tropical America. After deducting 80 per cent. for failures, and not allowing for new extensions, an area in bearing of at least 800,000 acres may be anticipated.

Our readers will observe that we have suggested a range of from one ton per ten to one ton per five acres for the various countries. We are quite aware when doing this that many estates have given 500, 600, 700 and over 800 lbs. per annum, but we also know that many properties are not so favourably situated as those whence such magnificent crops have been derived. Furthermore, we do know that many estates, including some of those most popular among investors to-day, have been treated as though their powers of endurance and recuperation knew no limit. We feel convinced that many trees cannot have their bark tapped with that regularity which is desirable, for the simple reason that material which should have lasted twenty-four months has been used up in about half that time. There has also been a large amount of experimental tapping on estates yielding virgin crops, which has resulted in the production of ugly wounds and irregular surfaces over which tapping cannot be repeated until a long rest has been given the trees. It is true that many London companies have recently sanctioned the application of large quantities of manure in order that cambial activity, on which the formation of renewed bark depends, may be stimulated. All these factors convince us that an average annual yield over a large number of years of from 300 to 400 lbs. of rubber will be as much as we can reasonably expect, if we are not to permanently depreciate the trees—the company's asset—on estates.—*India-Rubber Journal*.

Portuguese East Africa.

The following information is from the report by H. M. Consul at Lourenco Marques (Mr. R. C. F. Maugham) on the trade of the Portuguese Possessions in East Africa in 1911.

Rubber.—Various varieties of indigenous rubber occur in certain parts of the Mozambique Province, its collection being principally in the hands of Indians. One British firm has obtained a concession over the extensive forests south of Angoche, but it is believed that this is the only European undertaking of the kind in active working. The rubber is extracted from various *Landolphia* vines and is of moderately low grade; it is shipped largely to Hamburg, and is worth perhaps not more than 3s. 6d. to 6s. per lb. Large quantities of Cear  rubber have been planted in the Quilimane district and appear to be developing satisfactorily. H. M. Consul regards it as quite impossible for European associations and individuals to compete for the purchase of indigenous rubber with the Indian trader; such attempts as have been made have invariably resulted in failure. The collection of the product is made by Asiatics, who either dispose of it to European trading firms or ship it direct to Europe on consignment.

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Scientific Officer's Papers.

CVI—PLANT BREEDING.

The majority of the common vegetables, fruits and cereals that are grown to supply the food of mankind, have been under cultivation for many thousands of years and their origin is unknown and lost in the mists of antiquity. During this time they have undergone extensive modifications. In many cases the wild species from which they have been developed can be recognised and on comparing the cultivated varieties with these wild species it is seen that the former differ from the latter in possessing a greater development and improved flavour of those parts for which they are grown, the other parts of the plant being much the same. This change of development has been brought about by the agency of man, and at the present time endeavours are constantly being made to improve all cultivated food plants.

This work is done by several different methods. An important peculiarity of all living things is the variability of their sexually produced offspring, and among cultivated plants this variability is often considerable. A seedling which differs very appreciably from the characters of its parents is known as a *seminal sport* and it occasionally happens that one of these possesses characters of sufficient novelty, or usefulness, to render it worth cultivating. Many improved varieties of food plants have been in the past and are being in the present obtained by cultivating such seminal sports. On sowing the seeds produced by such a sport the majority of the seedlings will be found not to inherit its peculiar and desirable characters, but some few will do so. It is, therefore, necessary to 'fix' the type and this is done by a process known as *Selection*. The following is a good description of this method quoted from a standard text book of Agriculture:—

"The seeds of the plant showing the new features are sown and those individuals of the offspring possessing the same peculiar characters as the parent are allowed to produce seed, all others being pulled out and discarded. The seeds of this first selected generation are then sown and a further selection and sowing of those possessing the new attributes is made. This process is repeated for several generations until no weeding out is found necessary, that is until the new characters become constant in all the offspring, after which the variety is said to be 'fixed' and 'comes true' from seed. The time taken to fix a variety in this manner depends upon the power which the plant possesses of transmitting its characters to its offspring. This power is exceedingly variable and no rules can be laid down in regard to it; in some instances 50 per cent., or more, of the first

generation may resemble the parent and on sowing the seeds of these 90 per cent. of the seedlings may 'come true.' In such cases fixation of a new variety is tolerably easy and may be effected in three or four generations. In other cases the number of plants true to type in each succeeding generation may be very small and even after selection has been carried on for many generations a large proportion of the plants obtained at each sowing may possess none of the characters of the variety which the plant breeder wished to obtain."

The method of selection is evidently adopted more to annuals than perennials. If several years elapse before each succeeding generation bears seed, as in the case of Coffee or Rubber for instance, the fixing of a new variety is a long tedious business.

Variations in cultivated plants can be induced to a large extent by varying the external conditions of the plant and by crossing and hybridisation and these are the methods most usually employed to obtain new types, more especially in the case of perennials and plants which take a long while to reach the seed bearing stage.

The most certain method of inducing variation in a plant is to cross it with another individual. There is a mixing of the protoplasm of two distinct plants and the offspring, therefore, consists of living matter derived from two distinct and unlike sources. Variations produced in this way are much more frequently hereditary than characters produced by the action of external conditions and these variations can be further increased by method of selection. Not only is crossing of use for the purpose of inducing variability among plants so that selection may be begun but it is often resorted to in order to combine in one variety of plant characters previously possessed only by two different and separate varieties. A delicate variety of good quality when crossed with a hardy variety of poor quality sometimes gives rise to a hybrid combining the good quality of the former with the vegetative vigour of the latter. The hybrid having been obtained may be fixed by selection methods or reproduced vegetatively by means of cuttings, or grafts.

RUDOLPH D. ANSTEAD,
Planting Expert.

It is almost refreshing to read a statement by the Chairman at a plantation company meeting which does not announce that everything else is being cut out in the interests of rubber. In the whirligig of economic time no one can say whether rubber a few years hence may be earning more or less than tea or coffee. At any rate the Directors of the New Kali Selogiri (Java) Plantations are doing so well with Robusta coffee and prospects are so good that they have no thought of abandoning a fine source of revenue in order to bring rubber on more quickly. The circumstances are, of course, somewhat exceptional. "There is," said Mr. deCourcy Hamilton, "no hiding the fact that coffee somewhat retards the growth of the rubber trees, more especially during the earlier years, but as our estate is particularly favourable for Robusta coffee, rubber must take second place for the time being; and as our rubber is wide planted it will not overshadow our coffee for, say, six or seven years from planting, so we may look forward to good coffee crops for some years to come." And if the necessary labour can be obtained, it is the intention of the Board to open more land a little later and plant it with coffee only. The rubber is doing very well, but there is clearly no intention to sacrifice immediate and tangible advantage for prospective gain.—*The Rubber World.*

DISTRICT PLANTERS' ASSOCIATIONS.**Mundakayam Rubber Planters' Association.**

Minutes of the General Quarterly Meeting held at Aneikolam Bungalow at 11 a.m., on Saturday, July 13th, 1912.

PRESENT.—Messrs. J. R. Vincent, (Chairman), G. H. Danvers Davy, (Vice-Chairman), H. Byrne, E. E. Eyre, R. A. Fraser, E. R. Gudgeon, C. Byng Hall, F. H. Hall, J. M. Henderson, F. A. W. Meumann, K. E. Nicoll, W. P. Rogers, J. A. Richardson, E. R. Reid, F. Simmons, M. Smith, N. J. Strachan, R. Tait, E. B. Tapsell, F. E. Vernede, G. West, J. Wedderspoon, and A. C. Vincent (Honorary Secretary),

Minutes.—The minutes of the last meeting were taken as read.

Resignation of Honorary Secretary.—Mr. A. C. Vincent announced that the pressure of his other duties precluded him from continuing as Honorary Secretary. His resignation was accepted with regret.

Appointment of Honorary Secretary.—Mr. E. Vincent was proposed and elected unanimously.

New York Rubber Exposition.—The Chairman explained that as the machinery on most of the Estates was only in course of erection, members could not send in machine-made samples in time for the exhibition. It was resolved: "That the Honorary Secretary be requested to write to Mr. Staines Manders regretting the inability of the Association to send exhibits owing to the fact referred to."

Local Annual Subscriptions.—The Honorary Secretary was requested to call in these at once.

Delegate to the U. P. A. S. I.—Mr. G. H. Danvers Davy was proposed and unanimously elected to represent the association at the forthcoming meeting on August 12th, which he kindly consented to do.

Instructions to the U. P. A. S. I. Delegate.—The delegate was instructed as follows:—*U. P. A. S. I. Agenda No. 7 A Prevention of Thefts of Tea.* To vote for legislation.

8. *Scientific Department*—To support all suggestions for increased efficiency, excepting those of a financial nature which should be referred to the Association for its decision.

9. *Duties.*—To use his discretion with regard to the coffee cess and popularisation schemes, and to support the proposed export duty on Bones.

11. *Tea.*—To support the majority.

13. *International Rubber Exhibition, London 1911.*—To refer to the disposal of the funds subscribed to this exhibition.

14. *Labour.*—To put the views of the M. R. P. A. as strongly as possible with regard to recruiting and emigration, enticement of advanced labour to emigrate, and non-service of warrants.

Roads.—The Honorary Secretary was requested to draw the attention of the Division Officer, Kottayam Division, to the bad state of the Kanjirappalli-Erathupettah cart road, and to the state of the Kottayam to Kumili road between Kanjirappalli and Mundakayam. It was pointed out

that Government have lately put a Toll gate on the Kottayam-Kumili Road, and that the public in consequence deserved to have the road kept in better order than has hitherto been the case.

Post and Telegraph Office at Erathupetta.—It was resolved to support Mr. Asher in his request for a Telegraph Office to be established at Erathupetta, and that the Post Master should be empowered to register and insure parcels, and receive moneys for the Post Office Savings Bank.

Toll Charges at Kanjirappalli.—It was resolved that the Honorary Secretary should write to Government pointing out that a second charge is made on vehicles passing through the gates when the return journey is made the same day, and to request him to ask Government to reduce the charges so that a vehicle returning through the gates within 24 hours would pay only one Toll, instead of two, as at present.

Motor Transport Scheme.—It was proposed and unanimously decided: "That a Committee consisting of Messrs. K. E. Nicoll, G. H. Danvers Davy, E. E. Eyre, and J. R. Vincent, with the Honorary Secretary Ex-officio, be formed to represent Mundakayam on the Committee to discuss and go into the details of the scheme as proposed by Mr. Richardsons."

Legislative Council Member.—The Association recorded its appreciation of Government's kindness in appointing a planter, Mr. Richardson, to the Legislative Council, and heartily thanked Mr. Richardson for accepting the work.

Association Rules.—It was resolved: "That the General Committee go into and investigate the rules of the Association, and if necessary, suggest and advise amendments."

Correspondence.—The following were then read:—

(1). A letter from the U. P. A. S. I. showing that the whole of money subscribed for the Rubber Exhibition, 1911, was not spent, and stating that the amount due to the Association has been credited to its annual U.P.A.S.I. account. The Association recorded its regret that the whole of the money was not allotted to the purpose for which it was obtained. It was also remarked that the pamphlet and photographs received by the U. P. A. S. I. from London had not been sent around to the Associations concerned.

(2). Letters from Messrs. R. A. Fraser and N. J. Strachan, with regard to the arrest of Mr. A. Hamond, saying they had received no reply to the representations made to the British Resident. The Honorary Secretary reports that he also had not received reply to his letter on the subject. It was resolved that the Honorary Secretary should put the matter before the Government and ask for an early reply.

(3). Letters with regard to the importation of Tobacco into Travancore. The legality of *two* import duties was questioned.

(3). A letter from the South Travancore Planters' Association, with reference to the establishment of a Federation of the three Travancore Associations. It was pointed out that

(a.) Seceding from the U. P. A. S. I. the local associations would be deprived of the benefit of the attendance of the planting member in the Madras Legislative Council,

(b.) there would be no direct way of appealing to the Imperial Government on any question and that

(c.) as His Highness' Government has kindly appointed Mr. Richardson as a member of the Travancore Legislative Council to represent the Planters' Associations, any representations to His Highness' Government could be made through him. It was, therefore, unanimously decided that the Mundakayam Rubber Planters' Association cannot entertain any idea of secession from the U. P. A. S. I. and the Honorary Secretary was asked to put these views and the Association's decision before South Travancore Planters' Association.

(5). A circular letter from the C. M. S. which was handed to members to read and reply to individually.

(6). A letter from the Excise Commission with reference to the granting of liquor licenses in Mundakayam. It was proposed and carried "That Government be requested to kindly grant two licenses for 1912 and 1913, one to Messrs. J. P. Zachariah & Co., at the 35th mile, and the other to Messrs. S. P. Mel & Co. at the 33rd mile, near the Travellers' Bungalow." It was pointed out that a license is particularly desirable near the Travellers' Bungalow for the convenience of Travellers, and that it is not desirable to have two licensed houses at the 35th mile, within a few yards of each other.

(7). A circular letter from the U. P. A. S. I. with regard to rubber for the Imperial Institute. It was resolved: "That members should each bring a sample of the different kinds of rubber made by them, to the next meeting of the Association, and that the best be picked out by one or two members acting as judges, and sent to the Imperial Institute."

Date and Place of next Meeting.—It was proposed from the chair and seconded by Mr. G. H. Danvers Davy: "That the next meeting be held in the Travellers' Bungalow on the first Saturday in November 1912."

The meeting terminated with votes of thanks to Mr. Danvers Davy for acting as delegate to the U. P. S. I., to the retiring Honorary Secretary Mr. A. C. Vincent for his services, and to the Chairman for presiding.

(Signed) J. R. VINCENT,
Chairman.

(„) EDWIN VINCENT,
Honorary Secretary.

Coorg Planters' Association.

Minutes of the Proceedings of the Annual General Meeting held in the Club House, Mercara, on Thursday, July 11th, 1912.

PRESENT.—Messrs. Tipping, Bracken, Gerrard, Grove, Tweedie, Grant, W. R. Wright, Alexander, Mahon, Graham, Jackson, Maclean, Macrae, Hamilton, Cox, H. C. Wood, Irwin, Morgan, Haller Elsee and W. M. Ball (Honorary Secretary.)

Mr. Ball was unanimously voted to the Chair.

The result of the Ballot for Officers for 1912-13 was:—

President	...	Mr. C. E. Murray-Aynsley.
Honorary Secretary	...	Mr. W. M. Ball.

Committee North Coorg.

Messrs. J. A. Graham.
 „ J. W. Irwin.
 „ C. G. Maclean.
 „ W. E. Tweedie.
 „ Talbot Cox
 „ G. R. Pearce,

South Coorg.

Messrs. E. L. Mahon.
 „ A. H. Jackson.
 „ H. G. Grant.
 „ F. Macrae.
 „ W. A. F. Bracken.
 „ F. W. Gerrard.

Messrs. A. J. L. D'Beirne and C. Legard were elected members of the Association.

The Honorary Secretary read the report for past year and laid the accounts before the meeting. Mr. Bracken proposed and Mr. Tipping seconded: "That the accounts be passed."—Carried.

It was decided that owners are liable for subscription though absent from Coorg, this does not apply to Superintendents absent on leave.

Mr. Graham proposed and Mr. Tweedie seconded: "That the Association do join the Lady Amptill Nurses' Institute, the subscription to be raised amongst the members."

Mr. Elsee proposed and Mr. Graham seconded: "That the Honorary Secretary do ask the District Magistrate if he cannot see his way to extending the time limit for obtaining warrants against defaulters under Breach of Contract Act."

The Honorary Secretary read draft of proposed bye-laws for regulation of traffic on the roads.

Mr. Mahon suggested: "That the Honorary Secretary approach Government in the matter of the better up-keep of the Cannanore Ghât road and that more money be allotted and that halting places be made at shorter intervals."

Mr. Mahon brought up the matter of the Pollibetta Telegraph Office and proposed: "That Government be asked to raise it from a 3rd to a 2nd class office."—Carried.

Chairman read agenda of next U. P. A. S. I. meeting.

Mr. Macrae suggested that the question of a Paid President for the U. P. A. S. I. be brought up at the Conference.

Mr. Jackson proposed and Mr. Tipping seconded: "That the delegates to the U. P. A. S. I. do bring up the matter of the weights of manures and propose that the Coast Firms be asked to charge on the weights of manures as delivered on the Estates."—Carried.

Mr. Bracken proposed and Mr. Hamilton seconded a vote to the Chairman which closed the meeting.

REPORT FOR THE YEAR 1911-12.

Gentlemen,—You have the accounts before you and as you will see there are only two members in arrears with their subscriptions. This, I think, is very satisfactory. The Association now consists of 54 members.

Scientific Officer.—The great feature of the year was the successful carrying through of the Scientific Officer's Assistant scheme. We now have 22 subscribers representing 13,734 acres. Mr. Jonas, a young man with good scientific training, has been engaged and should arrive early in October. The Council of the Mysore Associations invited delegates from Coorg to

their meeting on 25th May last at Chickmagalur to meet Mr. Frattini, their newly arrived Scientific Officer's Assistant. Mr. Graham and myself accepted; an unfortunate accident, however, prevented Mr. Graham completing the journey. I went on alone to Chickmagalur where I had the pleasure of being introduced to Mr. Frattini and derived much profit from the discussions as to his work. Your Committee has accepted the offer of the Kali-Syndicate to give £100 for manurial experiments; for the carrying out of which arrangements will be made by Mr. Anstead on Mr. Jonas' arrival.

Roads and Communications.—Railway to Coorg.—As the Mysore Durbar has engaged Mr. Bell to advise them as to Railway extensions in Mysore the time seemed to me propitious to bring up the subject of a Railway to Coorg. I therefore have written to our Commissioner asking him to bring the matter before the Chief Commissioner and if possible to have us put in communication with Mr. Bell. Our roads have been well kept up on the whole and a considerable number more mile coolies are being supplied by Planters greatly to the improvement of the roads. I hear from Mr. Graham that the Sidapur-Suntikoppa road will be completely open immediately after the rains and Mr. Jackson tells me the Sidapur-Polibetta road is being traced and there is, so far as he knows, no obstacle to its early completion.

Pepper Stealing Prevention Fund.—Mr. Bracken informs me nothing of interest happened during the year. The balance in hand is Rs.94-12-0.

Coffee Stealing Prevention Fund.—Mr. Macrae reports that only one case was brought to his notice during the year. In this case all the accused, some coolies and the Estate Writer, were convicted by the Subedar, but the District Magistrate quashed the conviction of the Writer on the grounds that the evidence against him was not conclusive.

Mr. Macrae now awaits a copy of the judgment before asking the Committee to sanction some rewards. The balance in his hands is now Rs.52-9-9.

General.—Three hundred Labour Circulars in Canarese were received and distributed and it is hoped those in Tamil and Malayalam will soon be available. The non-service of warrants is still a great and growing grievance.

(Signed) W. M. BALL,

Hony. Secretary, C. P. A.

Various indigenous rubber plants occur in certain parts of the Mozambique Province, the collection being principally in the hands of Indians. One British firm has obtained a concession over the extensive forests south of Angoche, but this is, I believe, the only European undertaking of the kind in active prosecution. The rubber is extracted from various *Landolphia* vines and is of moderately low grade; shipped largely to Hamburg, it is worth perhaps not more than 3s. 6d. to 6s. per lb. Large quantities of Ceará rubber have been planted in the Quilimane District and appear to be developing satisfactorily. I regard it as quite impossible for European associations and individuals to compete for the purchase of indigenous rubber with the Indian trader. Such attempts as have been made have invariably resulted in failure. The collection of the product is thus made by Asiatics, who either dispose of it to European trading firms or ship it direct to Europe on consignment.—*Diplomatic with Consular Reports.*

CORRESPONDENCE.**Lime in Heavy Soils.**

Sir,—In reply to the letter of "Nilgiri Planter" in your issue of 27th July the following notes may be of use.

The Lime applied to the fields should be in the form of water slaked lime and should be reasonably pure calcium hydroxide, nearly free from carbonate. Water slaked lime has a markedly alkaline reaction and hence neutralises quickly any acidity which may exist in the soil. It also acts quickly in liberating plant food, particularly nitrogen. It is for these reasons that hydrate of lime should be used instead of carbonate of lime.

Simple tests for the purity of any sample of lime which can be carried out on the estate are not easy to devise. If the Lime is purchased as quick (unslaked) lime, the following is a rough and ready test which may be applied. Weigh out half an ounce of it, and put it into a tumbler. Take the temperature of some water with a thermometer, measure out two table-spoonsful of it and pour on to the lime. Stir the mixture with the thermometer and note the final rise in temperature. Under these conditions good quick lime should slake readily, that is combine with water to form calcium hydrate, and should give out enough heat to raise the temperature about 27° F.

To test whether the sample is free from carbonate a little acid, such as hydrochloric acid which can be bought at a druggists, should be poured on to a little of the lime in the tumbler; if carbonates are present an effervescence will be produced.

Probably the best way for the "poor planter" to ensure that he applies good lime to his land is for him to purchase it from a reliable source in the first instance and take care of it when he has got it. It should be applied as soon as possible, and if stored it should be kept carefully protected from the air. Air slaked lime contains a lot of carbonate because the carbon di-oxide gas in the air combines with the calcium oxide to form calcium carbonate. For the same reason the slaked lime should be covered after it is applied, either by lightly forking it into the top two or three inches of soil or by covering it over with mulch.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Purification of Camphor.

In an article recently produced in the *Planter's Chronicle* describing the distillation of camphor it was stated that, the crude camphor may be purified by sublimation, being heated with a mixture of Lime or Charcoal, and the pure camphor collected in the form of "flowers" from a bell jar.

A correspondent writes asking how this purification process should be conducted.

The impure camphor should be mixed with about its own bulk of Lime, which acts as a drying agent, or powdered charcoal, and spread out in a thin layer on a copper plate and covered with a glass bell jar supported at a little height above it. Heat should then be gently applied to the plate. The Camphor in the mixture will then evaporate, or sublime, leaving the impurities behind and the vapour will condense on the cool sides of the bell-jar in a pure powder-like form known as "flowers." When the process is complete and no more camphor sublimes off the bell-jar is removed and the pure camphor collected from it.

RUDOLPH D. ANSTEAD, *Planting Expert.*

PLANTERS' ASSOCIATION OF CEYLON.**Committee Meeting.**

Extracts from the Minutes of the Proceedings of a Meeting of the Committee of the Planters' Association of Ceylon, held at Kandy, on Friday the 12th. July, 1912, at 2-30 p.m.

RUBBER SHIPMENTS AND STRONGER CASES.

Laid on the table the following circular received from the Secretary of the Rubber Growers' Association.

C. Taylor, Esq., Secretary, Rubber Growers' Association, Oxford Court, E. C.

PACKING OF RUBBER.

Sir,—With reference to my letter of the 28th March last, upon the above subject, I beg to hand you herewith a copy of letter addressed to this Company by the Commander of the P. & O. s.s. "Sumatra" to which I would call your particular attention.

Yours faithfully,

(Signed) J. MORTLEMAN,

Secretary,

Homeward Japan, China and Straits Conference,
8, Billiter Square, E.C., May 28th, 1912.

"I beg to draw your attention to the condition in which the rubber shipments have been received in Port Swettenham and the packing of this valuable cargo, as out of a shipment of over 1,700 cases at least 100 were either in a damaged condition or damaged by handling, the latter not due to carelessness but owing to the frail nature of the cases. In the majority of cases the rubber is packed in a cheap brittle wood case, the ends being dovetailed, with a narrow iron band on the extreme edge. When a sling of even six cases is landed on the hatches the mere fact of landing them starts the dovetailing; and forces the ends open, and owing to the springey nature of the contents, and the brittleness of the wood, it is impossible to repair them in a proper manner (unless the contents are put in cases, which was done with the three worst this time) the consequence being that the contents are left more or less exposed and liable to pillage.

"We keep all the rubber we can in the lock up, but shipments are now so large that a certain amount is in the holds, and if damaged and exposed it leaves a great risk of pillage. Will you respectfully allow me to suggest that it should be put to the shippers to put, say, three bands round their cases one way, and two across, as it is done by some shippers in Colombo—or to pack them in Venesta cases like the Highlands and Lowlands Estate for it is surely to the shippers' interest to have their cargo landed in good order."

DESTITUTE TAMILS IN COLOMBO.

Read letter from the Rev. P. Middleton Brumwell, Secretary of the Friend-in-Need Society, on the subject of destitute immigrants.

Resolved:—"That the Secretary of the Planters' Association do write to Mr. Brumwell thanking him for his letter and promising hearty co-operation in any practical scheme for assisting these persons which he can suggest. It was pointed out that while doubtless some beggars had at one time been coolies on estates they had not been turned off estates, but were almost always coolies who had bolted."

COAST AGENCY.

The appointment of Mr. H. Scoble Nicholson to be Ceylon Labour Commissioner which was made by the Coast Agency Committee at the meeting held in the morning was made known to the General Committee, and met with unquestioned approval.

The Chairman intimated to the Committee that though they were not the appointing body of the Coast Agency Committee, nevertheless, he wished them to have full information on the matter of the dismissal of Mr. Norman Rowsell from the post of Labour Commissioner. He detailed the facts leading to the above action of the Coast Agency Committee; informed them of the amount of the losses incurred, and invited the members present to ask any questions.

The meeting accepted the Chairman's statement without question.

An extract of a letter from the Ceylon Labour Commissioner (Mr. C. G. Ryan) was read showing that the present year is an exceptionally good one for the recruiting of labour from the Coast.

(Extract referred to)

"The number of coolies passing through Trichinopoly in June was 12,546, a record. In May the number was 11,717, or 24,263 in the two months. The total for the six months is 42,338 as compared with 30,690 for the same period of last year."

It was resolved:—"That Messrs. Ford, Rhodes, and Church be written to and cordially thanked for their assistance in the matter of an audit held in Trichinopoly of the Ceylon Labour Commission accounts and for their able report."

It was also resolved:—"That Mr. C. G. Ryan be informed of the Association's deep sense of obligation in the matter of the great services he has rendered them, and that he be elected an Honorary life member of the Planters's Association of Ceylon, the presentation to be made at a general meeting."

Portions of a circular said to have been issued by the United Planters' Association of Southern India and forwarded by the Nuwara Eliya District Planters' Association were read, and the Secretary was directed to forward the same to the Ceylon Labour Commissioner with a request for his suggestions as to what steps, if any, it would be advisable to take to remove any false impression that may have been created against emigration to Ceylon.

ORDINANCE No. 9 OF 1909.

Read letters from the Kelani Valley and Kegalle District Planters' Associations on the subject of the feasibility of including all employers of labour under this Ordinance, and it was intimated that the members of the Joint Labour Conference—held in Colombo on April 27th, 1912—had discussed this matter and by a majority had come to the conclusion that this was not at present practicable.

Read letter from the Colonial Secretary enclosing copy of a letter from the Chief Secretary of the Federated Malay States inquiring as to the success or failure that has attended the introduction of the discharge ticket (Ordinance No. 9 of 1909) system which is now in force in Ceylon. Resolved:—"That this Committee is of opinion that the discharge ticket system is working very well in Ceylon."

RUBBER

Mid-East Hevea Rubber Prepared in the Brazilian Manner.

AN ANALYSIS.

The latest number of the "Bulletin of the Imperial Institute" contains some valuable information as to the constituent elements of Mid-East Hevea rubber, when prepared by the Brazilian method, which method retains all the solids of the latex.

The writer of the article says:—Two small specimens of smoked Pará rubber from the Botanic Gardens at Singapore, representing a consignment offered for sale in the United Kingdom, were forwarded for examination to the Imperial Institute by brokers in London, who stated that the rubber had been prepared experimentally by the Brazilian method of smoking. On examination in the usual manner it was found that the rubber contained a very high percentage of "resin," (*i.e.* matter soluble in acetone), amounting to 5.2 per cent. on the dry material. This proportion of resin is very much higher than is usually present in Pará rubber from the East, but owing to the smallness of the samples supplied to the Imperial Institute it was not possible to investigate the matter in detail. Subsequently, however, a large specimen of smoked rubber, carefully prepared from the latex of a single tree by the same process as that employed for the earlier specimens, was forwarded for further examination to the Imperial Institute by the Director of the Botanic Gardens at Singapore.

The specimen consisted of a spindle-shaped piece of smoked rubber, weighing 6 lbs., which was almost black externally but whitish within when cut. The rubber was rather moist, and a quantity of brown viscous liquid was present between the concentric layers.

An analysis of the rubber gave the following results:—

				Rubber as received	Composition of
				per cent.	dry rubber.
					per cent.
Moisture	...	...	...	7.4	...
Caoutchouc	...	...	...	84.6	91.4
Resin	...	...	...	4.4	4.8
Proteid	...	...	...	2.9	3.1
Ash	...	...	...	0.7	0.7

The percentage of "resin" present in the dry rubber was a little lower than that found in the previous samples (4.8 per cent. compared with 5.2 per cent.), but was still very much higher than the amount usually present in plantation rubber from the East.

An examination was made of the portion of the rubber dissolved by hot acetone, and it was found that a large quantity of a solid crystalline substance, which was soluble in hot water, was included with the resin. This substance amounted to no less than 2.7 per cent. of the dry rubber so that the true figure for the percentage of resin in the dry rubber was only 2.1 per cent. instead of 4.8 per cent.

The crystalline substance was submitted to a detailed examination and proved to be a carbohydrate, which was identified as *laevo-methylinosite*. The presence of this substance in the aqueous portion of the latex of *Hevea brasiliensis* remaining after the coagulation of the rubber had been recorded previously by De Jong, and closely allied carbohydrates are known to occur in other latices. The presence of such a large amount of the 1-methylinosite in this specimen of Pará rubber is no doubt to be attributed to the method of preparation employed, whereby the whole of the solid

constituents of the latex remain in the rubber, whereas in the usual method of coagulation adopted in the East the rubber separates from the aqueous portion of the latex, which retains the soluble constituents in solution.

In order to complete the investigation, a supply of the latex of the same tree from which the rubber had been prepared was obtained from Singapore. The aqueous portion of this latex, after separating the rubber, was found to contain a quantity of the 1-methylinosite, amounting to 0.46 per cent. of the total latex. The presence of this carbohydrate has also been proved in fine hard Pará rubber from South America.

The results of this investigation are of considerable practical interest as showing that in the analysis of rubber prepared by the Brazilian method (or by any method which leads to the inclusion in the rubber of all the solid constituents of the latex) it will be necessary to take into account the possibility of other substances besides resin being extracted from the rubber on treatment with hot acetone.—*Rubber World*.

Where Rubber Comes From.

It is quite apparent says the *India Rubber Journal* that a considerable interest is now being evinced not only in the geographical distribution of various rubber-yielding trees, vines and shrubs, but also in the characteristics of the plants yielding rubber in different areas. If we can only have a sound knowledge of the actual structures wherein latex accumulates in the plants it is quite conceivable that many improvements may be effected, particularly in the methods of tapping and the periodicity of tapping operations. In the distribution of rubber plants there is quite a good deal to learn, and information is already at hand which may throw some light on the climatic environments most desirable for the different species. For instance, we find that though *Hevea brasiliensis* is characteristic of certain forests in the Amazon region, it is to some extent replaced by other species as one goes north. *Manihot* also replaces *Hevea* generally in North Brazil and Bahia, *Sapium* replaces *Manihot* in Honduras and the Guianas, and *Castilloa* replaces *Sapium* in Central America and Mexico. It is true that many of these species overlap one another in their distribution, and if one studies the climatic conditions in each area where there is a predominant type, one can learn a good deal which may be of use in planting operations later.

CLASSIFICATION ACCORDING TO HABIT.

There are many systems of classification which are adopted in a study of caoutchouc-yielding plants. One of the most popular is that according to habit; in this three groups are distinguished, *viz.*, trees, timbers and shrubs. In the tree forms we have *Ficus elastica* in the Malay Archipelago, which grows to an enormous height. We have *Castilloa*, a handsome tree characterized with very rapid growth in the first four or five years, common in Central America and Mexico. There is the genus *Manihot* in North Brazil and Bahia, which provides a well-branched tree. In Africa, the genus *Funtumia* is responsible for many trees, and in Brazil *Hevea* is predominant. *Hevea* and *Ficus* are large forest types, the smallest are probably *Funtumias* and *Manihot*, *Castilloa* coming midway between these groups. Among the climbers we have the *Landolphia* vines of Africa and Madagascar, the genus *Forsteronia* in the West Indies, and *Parameria* in the Middle East. The first-mentioned genus is, of course, the most important among the vines; it is exclusively African, and is responsible for rubber of high quality. Among the shrubs there is really only one example, *Parthenium argentatum*, the Guayule shrub so well known as a source of useful rubber.

(To be continued.)

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THE U. P. A. S. I.

(INCORPORATED.)

The Secretaryship.

Mr. Fletcher Norton has arrived in Bangalore and assumed his duties as Secretary of the U.P.A.S.I. on 2nd August.

The U. P. A. S. I. Exhibition.

Mr. G. N. Frattini, the Scientific Assistant for Mysore, will arrive in Bangalore on or about the 8th August in order to take charge of the Exhibition, which it is proposed to hold as usual in connection with the Annual Meeting. Mrs. Abbott and Mr. W. H. Reed, who have also kindly consented to give their help, have been appointed a Committee to act with Mr. Frattini and arrange the exhibits and generally take charge of the Exhibition.

The Indian Tea Cess.

The Secretary of the Indian Tea Cess Committee writes as follows:—

“The question of the renewal of the cess for a further period has recently been engaging the attention of the Cess Committee, who have been in correspondence with the Indian Tea Association and with the various members of the Cess Committee regarding it. The Committee of the Indian Tea Association (London) have expressed themselves as being unanimously of opinion that the renewal of the cess should be applied for and the General Committee of the Indian Tea Association, Calcutta, have also expressed the same opinion. So far as the Cess Committee is concerned, the Executive Committee are also of that opinion and the representatives of the following District Associations have recorded the view of the Associations they represent, to the effect that a renewal of the cess should be asked for:—

The Assam Branch, Indian Tea Association.

The Darjeeling Planters' Association.

The Dooars Planters' Association.

The Terai Planters' Association.

The Dehra Dun Planters' Association.

“The views of the Surma Valley Branch Indian Tea Association have not yet been received.

2. “The Executive Committee recently circularised the various members of the Cess Committee on the subject with a view to ascertaining the feeling of those represented by them, but no reply has been received from Mr. Carson Parker, the representative of your Association, and it is

thought possible that he has gone home. Should this be so I am directed to ask if you will be good enough to inform the Cess Committee whether the United Planters' Association of Southern India are in favour of a continuance of the cess. A very early reply is requested as it is desirable that there should be as little delay as possible in approaching Government in the matter. And I am directed to add that the Executive Committee need hardly say that they hope that your Association will support the proposal for a continuance of the cess. In this connection I am directed to send you a copy of a note on the subject by Mr. H. S. Ashton, London: Mr. Ashton would prefer that his note should not be published in any way."

Mr. A. D. Jackson, Madras, writes :—

"I have received from the Indian Tea Cess Committee a copy of their letter of 27th instant addressed to your Association and I have been asked to assist if possible in obtaining for the subject matter of it an early and favourable consideration. I understand that the Association's own representative, Mr. Carson Parker, is at home on leave.

"I may mention that the Madras Chamber of Commerce, which I represent on the Cess Committee, has expressed itself favourable to a renewal of the Cess and its opinion that hitherto the Cess Funds have been well administered to the considerable advantage of the Indian Tea Industry."

Hemp Cultivation.

The Acting Director of Agriculture, Bombay, has kindly forwarded for publication the following extract from a letter written by Mr. Alfred Wigglesworth of Messrs. Wigglesworth and Co., 82 Fenchurch Street, London E.C. dated 17th May 1912 addressed to Major A. T. Gage, I.M.S., Superintendent, Royal Botanic Garden, Calcutta.

"We think that a very great future could be made for the Hemp trade in India if they would adopt better methods of preparation. For instance, in the philibhit district there is no earthly reason why they should "ret" this material in muddy water, if not in mud, as it results in deteriorating the strength of the fibre and in filling it up with such volumes of dust that some of the European countries have actually had to legislate against its use except by the introduction of expensive dust collectors, to save the working people from being injured by breathing the atmosphere. In the Godavery delta the practice is at its best, also in Gopaulporte and Bengal, and if they could be studied and introduced to the rest of India, then we should have qualities of Hemp of greater uniformity, and a much higher price would be obtained for the product. In Jubblepore they grow a fine class of fibre; sometimes it is prepared in fresh water and is free from dust, but at times it also is prepared in muddy water and the fibre is deteriorated and weighted with dust in consequence.

"Owing to the scarcity of European Hemps during the last season, the demand for Indian fibres has been very great and the prices have gone up to a figure unheard of in the history of the trade. All this should encourage the native grower to enlarge the production and to improve his methods.

Customs.

The Customs Circular No. IV of 1912 issued by the Government of India states that, "In exercise of the power conferred by section 9 of the Indian Tariff Act 1894 (VIII of 1894) the Governor General in Council is pleased to cancel the notifications of the Government of India imposing under sections 8A and 8B of the said Act, additional and special import duties on Sugar produced in or exported from the Argentine Republic."

Notes and Comments by the Scientific Officer.

159. *Smoked or Unsmoked Rubber*.—In January last, while in Madras, I had the pleasure of meeting Mr. T J. H. Schmitz, a representative of the Firm of Messrs. Kaltenbach and Schmitz, big importing Agents in London. Mr. Schmitz was on a trip round the world combining business and pleasure and finding that his firm was more or less interested in Rubber. I had a long conversation with him on the subject and asked him, among other things, about the market values and prospects of Smoked as compared with Unsmoked Hevea Rubber. He kindly promised to get me some information on the subject on his return home. That promise was redeemed last mail by an interesting letter from Messrs. Kaltenbach and Schmitz in the course of which they say, that the bulk of plantation Hevea Rubber "is being made into Smoked Sheet, which, as a rule, is the most satisfactory, although carefully prepared. Unsmoked Crepe is always very saleable, but at present" (the letter is dated 27th June.) "There is not so ready a sale for Smoked Crepe as for Unsmoked, although there is very little doubt that it will come more into favour later on; up to now it is not tenderable under Market Contracts, but it is sure to be admitted later, when supplies become larger and more regular."

The Firm have kindly sent me some small samples of Smoked Sheet and good average Unsmoked Crepe, which were valued on the day of writing at 4/8½ per lb. and 4/10 per lb. respectively. These samples will be on view for the benefit of planters at the Exhibition to be held as usual in connection with the forthcoming Annual Meeting of the U. P. A. S. I.

It will be interesting to compare these samples and their prices with the estate samples at the Exhibition, and they may serve as a guide to planters of the kind of Rubber which finds favour in the London market.

The same firm inform me that the auctions of 2nd July contained 575 tons of Eastern Plantation Rubber. There was a good demand at the opening, and prices generally are fully up to the average of last auctions, except for 1st Latex which is selling at 4/10½d.

Hard Fine Pará 4/8½d. to 4/9d., Soft Fine 4/2½d.

So far prices are :—

SHEET.—Fair to Fine Smoked	...	4/8¾d. to 4/9¾d.
Fair Unsmoked	...	4/8¾d.
Damp, Mouldy & Stuck	...	4/5d. to 4/8d.
CREPE.—Thick, Dull to Fine	...	4/9½d. to 4/11¼d.
Dull Palish to Pale	...	4/9¾d. to 4/10½d.
Good & Light Brown	...	4/5d. to 4/9¼d.
Dark & Black	...	4/- to 4/5d.
Black, Soft, pressed	...	3/5d. to 3/10d.
Dark Smoked	...	4/4½d.
SCRAP.—Fair	...	3/6d. to 3/7½d.
Mixed & Inferior	...	2/9d. to 3/4½d.

RUDOLPH D. ANSTEAD,
Planting Expert.

CORRESPONDENCE.

Lime in Heavy Soils.

Sir,—In continuation of the letters which have appeared in the *Chronicle* on the above subject a correspondent writes to me asking :—

- (1) What kind of soils may be considered heavy ?
- (2) What period may be considered as quickly in the statement, "it acts quickly in liberating plant food?"
- (3) Whether Lime is better applied on the surface of the soil and held over, or forked in to a depth of six or eight inches ?

The following Notes on these questions may be of general interest :—

(1.) The terms 'heavy' and light as applied to soils are unfortunately chosen since they do not refer to the weight of the soil but rather to the ease with which it is worked and its resistance to the passage of a plough. Clay soils are heavy and sandy soils are light. The boundary line between light and heavy soils is an arbitrary one but a soil containing more than 25% of particles with a diameter less than one five thousandth of an inch are usually classed as clays, while soils containing from 15 to 25% of such particles are called clay loams and are heavy. A soil which is sticky when wet and which dries hard and cracks will usually benefit from an application of lime.

(2.) All times are comparative, and the time taken to liberate plant food depends upon many conditions among which climate is a most important one. Perhaps three months may be said to be 'quickly.' The point is that organic matter in the soil becomes more rapidly available in the presence of lime than in its absence.

(3.) The lime should be applied as slaked lime and should be spread as evenly as possible on the land and immediately worked into the top two or three inches, or covered over with a mulch of leaves. It is important that the lime should be thoroughly mixed with the soil, and it should never be applied and dug in.

RUDOLPH D. ANSTEAD, *Planting Expert.*

RECRUITING PROSPECTS.

Mr. C. Ryan, who has been acting as Ceylon Labour Commissioner in India until a permanent appointment, says the *Ceylon Observer*, returned to Ceylon yesterday *via* Tuticorin, and has taken up his quarters at the G. O. H. In conversation with an *Observer* representative there this afternoon he stated that the recruiting prospects in Kudappah and Salem are distinctly good, owing to shortage of foodstuffs. Kudappah is in the Telugu district, and the coolies there are most suitable for the lowcountry in Ceylon. If recruited for the lowcountry, they would be able to free the existing lowcountry labour for upcountry districts. Mr. Ryan also stated that he had been informed that the prospects in Malabar were also good. He pays a high tribute to the courtesy and kindness of the higher officials of the South Indian Railway, and the civility of the minor officials.

Referring to the Coast Agency Committee he said this was a most excellent institution, and every Ceylon planter should join the scheme. It had done good work in the past, and under good guidance was going to do much better in the future.

DISTRICT PLANTERS' ASSOCIATIONS.**Nilgiri Planters' Association.**

At a General Meeting of the Nilgiri Planters' Association held at the Armoury, Ootacamund, on Thursday, the 18th July, 1912.

PRESENT.—Messrs. E. F. Barber, in the Chair; J. S. Nicolls, Honorary Secretary; W. Rhodes James, J. H. Wapshare, E. Hardy, J. Harding Pascoe, C. H. Brock, R. N. C. Groves, A. S. Dandison, C. Gray, A. K. W. Downing, L. L. Porter, G. W. Fulcher, B. Von Dulong. *Present by Proxy*:—Mr. J. B. Vernede, and Mr. W. C. Deane. *Visitors*:—Mr. E. H. Jones, Deputy Superintendent of Police, and Mr. T. C. Manders.

No. 30. *Proceedings of last Meeting* were read and confirmed.

No. 31. *Rules*.—These were passed and confirmed. The Honorary Secretary was instructed to have them printed and circulated amongst members.

No. 32. *Rule 20*.—Mr. Nicholson's communication recorded.

The Honorary Secretary was instructed to write to Mr. Nicholson on the subject.

No. 33. Read U. P. A. S. I. circulars.

No. 34. *Mr. Ormerod's resignation*.—Read the Chairman, U. P. A. S. I.'s. letter and Honorary Secretary's replies which were confirmed.

Delegates to the U. P. A. S. I., were given a freehand as regards voting on matters referred to in Mr. Abbott's letter of 25th May, 1912.

No. 35. *U. P. A. S. I. Draft Agenda*.—List of subjects were considered, special instructions being given to Delegates to oppose "The Green Tea Cess Bonus," to support registration whether voluntary or compulsory, and *Planters' Chronicle* being kept as a weekly edition, all other subjects being left to the decision of the Delegates.

No. 36. *Experimental Plot*.—Read correspondence, the Honorary Secretary being instructed to write and thank the Collector stating the limit of our requirements.

No. 37. *Act I of 1903*.—In reference to No. 25 of meeting held on 30th May, 1912, Correspondence recorded. The matter is being considered and a reply will be sent as soon as possible.

No. 38. *Non-Service of Warrants*.—In reference to No. 28 of meeting held on 30th May 1912. Correspondence read and recorded, the Honorary Secretary being instructed to write to the Inspector-General *re* D. I. G.'s report.

No. 39. *Railway Freight*.—No further progress was recorded.

The following resolution was proposed by Mr. L. L. Porter and seconded by Mr. A. S. Dandison:—"That the S.I. Railway would consider the question of reducing the rate by passenger train on tea seed imported into S. India and whether they could see their way to approach other railways concerned with a view to their also granting a reduction. Tea seed being a perishable article it is important that it should not be delayed in transit as must occur if it is sent by Goods Train."

No. 40. *Roads*.—This was discussed at length, further discussion being postponed till next meeting.

No. 41. *Cattle Permits*.—The following resolution was proposed by Mr. E. Hardy and seconded by Mr. J. H. Wapshare:—"That the Honorary Secretary be instructed to write to the District Forest Officer requesting that a representative of the Forest Department be sent out on or about the 20th July in each year to Naduvattam to issue cattle grazing permits and that owners and managers of estates in the Naduvattam District be given previous intimation."

No. 42. *New Member*.—Mr. J. B. Vernede was elected.

Votes of thanks to the Chair and O. C. Nilgiri Volunteers for use of the room terminated the proceedings.

(Signed) E. F. BARBER,
Chairman.

(„) J. S. NICOLLS.
Hony. Secretary.

Papers on Table.—G. O. No. 866, dated 31st May 1912. G. O. No. 1914, dated 28th June 1912. The Memoirs of the Department of Agriculture for May 1912. Prospectus of the Mysore Dasara Industrial and Agricultural Exhibition 1912.

No. 45—T. C. Indian Tea Cess Committee report for the year 1911-12 by Commissioner in Europe.

Prof. R. Newstead, the greatest authority on scale insects of the Liverpool School of Tropical Medicine, showed a fine collection of injurious scale insects. I noted that this fine collection was closely scrutinised by visitors. From Dr. Berger of the Agricultural Experimental Station, Florida, U. S. A. came an exhibit of various scale insects with the minute fungi which attack them in that country and in other tropical and sub-tropical countries when the damp season comes on. Were it not for these minute fungi the scale insect would destroy citrus plants altogether in Florida, and the coffee plant in India, and rubber plants in other parts of the world would have a poor time of it were it not for these minute fungi, which regularly attack the scale as soon as the damp or rainy season comes along. I have had sent me from India coffee leaves with the scale insects surrounded by a sort of halo or fringe, which under the microscope was seen to be exceedingly minute fungus. Among the exhibits I noted a red-headed scale fungus, *Sphaerostible conophila*. The white fly of the citrus plant was also shown (*Aleurodes nubifers*) with a yellow fungus attacking it named *Aschersonia flavocitrina*. There was a turbinate scale parasited by *Aschersonia turbinata*, and the San Jose scale parasited by *Myriangium*. This was an exceedingly interesting exhibit, as it showed how nature strikes a balance in these matters. It would be interesting to know whether this *Myriangium* could be made to grow in the colder districts of America and Canada, where San Jose scale has become such a nuisance. It may be, however, that this fungus will only grow in very moist atmospheres, as I know my friends in India say that the scale fungus will not begin to grow and destroy the scale until the moist, rainy season comes on.—*Fruit Grower and Market Gardener*.

PEPPER.

The *Scientific Report of the Taliparamba Agricultural Station* for 1911-12 by H. Southern, the Acting Deputy Director of Agriculture, Southern Division, has just come to hand. It contains the following interesting account of the experiments which are being conducted with pepper at that station and the results obtained. The report on these experiments for last year, 1910-11 was reproduced in the *Planters' Chronicle*, Vol. VI, p. 492.

"Though flowering was late this year the setting of berries was good, and taking into consideration last year's comparatively low yield and the improved condition of the garden generally, a record yield was expected; the advent of the north-west monsoon, however, put a stop to this, as the heavy rains and strong winds caused much shedding of spikes. About the end of October, 'Pollu' disease made its appearance and spread very rapidly, the conditions evidently favouring it. Block III where the natural drainage is bad, was as usual badly attacked and to say that 25 per cent. of the crop was lost is not over-estimating the damage done by this pest in this part of the garden. The pepper gardens in the neighbourhood of the farm also suffered severely and it is to be hoped that now an Entomologist has been appointed to this Presidency, some means of fighting this disease will be discovered.

"Table II shows the total yield of green pepper in Madras measures for the last 7 years and from this it will be seen that this year's yield of 3,654 Madras measures is the highest on record, with the exception of the 1910 crop, which is a satisfactory result considering the adverse season.

"*Experimental Plots.*—Table III shows the yields of the several plots under experimental treatment and the results, as a whole, bear out the conclusions drawn last year. Now that the young vines are beginning to bear, the plantwar yields are naturally lower.

"*Lime and Leaf-mould.*—This plot shows a more marked improvement than any other and the healthy appearance of the foliage even in the hot weather is very noticeable. The yields which have increased every year since the experiment was started as follows:—

1907	...	...	5.75	Madras measures.
1908	...	...	28.5	do.
1909	...	...	36.00	do.
1910	...	...	78.00	do.
1911	...	...	91.00	do.
1912	...	...	113.5	do.

"*Gingelly oil-cake.*—The behaviour of this plot has been very erratic and it is impossible at present to draw any conclusions. From the alternately high and low yields one might conclude that this plot contained chiefly *Kalluvalli* vines, but as this is not the case the reason may be due to an exhaustive re-action produced by the manure. The yields are as follows:—

1907	...	...	1.75	Madras measures.
1908	...	...	13.5	do.
1909	...	...	27.00	do.
1910	...	...	50.25	do.
1911	...	...	19.625	do.
1912	...	...	49.75	do.

"The following plots continue to show steady improvement as will be seen from the yields which are as follows in Madras measures:—

Year.	Fish manure	Cattle manure	Leaf-mould
	plot.	plot.	plot.
1907	... 37'75	2'75	7'00
1908	... 72'25	32'5	52'5
1909	... 86'25	35'5	21'25
1910	... 156'5	83'25	73'00
1911	... 98'5	43'625	28'75
1912	... 103'25	71'00	47'00

"The moulding and leaf-mulch plots.—The condition of the vines in these plots is very much improved and the yields would have been much higher but for the severity of 'Pollu' attack.

"Green manure plots,—No very marked improvement has been noticed in any of these plots and the growth of green manure crops generally is not very satisfactory. The sun-hemp (*Crotolaria juncea*), *Cassia tora*, and Kolingi (*Tephrosia purpurea*) plots failed: evidently these crops are not suited to shady situations. The Ponnani cowgram, horse gram and ground-nut plots made a fair growth and the vines in the latter plot seem to show some improvement which may, however, be due to the extra digging which the ground receives at sowing time.

"Standards.—Thekkam Karayan (*Garuga pinnata*, Roxb) and Ambayam (*Spondias mangifera*, Willd) have proved themselves superior as standards to Muruku (*Erithrina indica*), especially in old gardens where there is usually heavy top shade; they are consequently being substituted for the latter as the old standards die."

RUBBER COURSES IN LONDON.

A course dealing with the chemistry and analysis of rubber has been established at the Northern Polytechnic Institute, Holloway, London, Mr. Frederick Kaye being in charge with a total attendance of 38.

The students may be divided into three groups:—

(a) Young men intending to go to Ceylon or Malaya, to be attached to plantations.

(b) Men engaged in the London rubber market, attached either to brokers' offices, or to those of plantation companies.

(c) Men engaged in the manufacture of rubber, or in London rubber warehouses.

The first part of the course was devoted to the study of crude rubber production, as well as to its analysis and the estimation of the commercial value of different rubbers. Attention is now being directed to methods of vulcanization, in addition to the physical and chemical investigation of vulcanized articles.

Next year the students will, it is expected, be able to devote themselves to more thoroughly analytical work, as the laboratory installation will then be more complete.

It is a distinct encouragement to the cause of rubber research to find the subject so successfully taken up in England.—*The India Rubber World*.

RUBBER.

Where Rubber Comes From.

[Concluded.]

CLASSIFICATION ACCORDING TO STRUCTURE.

Another useful system of classification is that according to the part of the plant which yields the rubber. Under this heading there are three groups: (1) stem, (2) root, and (3) the whole plant. Among stem rubbers one can include arborescent forms such as *Hevea* and *Manihot*, and climbers as *Landolphia* and *Parameria*. Among the root rubber we have *Clitandra*, *Carpodinus*, and many other African genera, from which rubber is obtained by macerating the bulbous roots and extracting with water. The whole plant may yield rubber, as in the case of the guayule shrub where the whole structure is uprooted and subjected to maceration. Perhaps one might also include *Palaquium*, since it gives gutta not only from the stems, but also from its leaves.

TRADE NAMES AND BOTANICAL ORIGIN.

It is singular that there are many instances of trade names being associated with the produce from one species only. For instance, fine hard Pará we know always comes from *Hevea brasiliensis*; Rambong from *Ficus elastica*; Ceará from *Manihot Glaziovii*, etc., etc. On the other hand there are many instances of trade names being applied to produce derived from quite a number of species, and in the last category we find the same species may provide different named rubbers in different parts of the world. The best example of the last group is probably to be found in the produce from *Landolphia Heudelotii*, this species providing Soudan niggers, Gambia balls, Massai, and many other grades known as niggers, twists and flats.

At the present time it is admitted that there is a very wide variation in the characteristics of rubber from different plants distributed throughout the Tropical zone in both Hemispheres, but it must also be admitted that there are indications of a change which is likely to come over the character of our supplies. We find that the climbing forms which hitherto have given us such large crops in Tropical Africa are showing a reduction in quantity, and that silk rubber from Uganda, Ceará rubber from East Africa, and *Hevea* from West Africa, are gradually taking up a definite position in supplies from that part of the world. In the Middle East Rambong rubber, known as such an important supply in years gone by, is undoubtedly dwindling. Even *Palaquium* as a source of gutta is now almost neglected. In both these areas—Tropical America and the Middle East—there is a tendency for rubber from tree forms to gain a premier position, and in both areas the same type—plantation Pará—appears to be leading easily as a grade on the market. In Tropical America itself, it is true that the old supplies, which it must be remembered were mainly from trees, are being maintained, but even in that area one can see that many efforts are being made to turn out a purer product, and one which will show much more constancy in physical and chemical characteristics. Taking the trend of events over the whole of these areas, one can foresee that within a few years the rubber from *Hevea brasiliensis* will be the predominant type. This fact must not be lost sight of by those now depending upon other sources, for the simple reason that the produce from *Hevea brasiliensis* is unquestionably the standard in manufacture, and it is, therefore, one which will be most favoured when supplies come forth in large quantity and prices decline to a very low level.

Following out our remarks on the subject of plants yielding caoutchouc, we are led to an examination of the actual structures wherein latex accumulates. It must be realized that in almost every country there are numerous plants which yield latex. But all such plants do not necessarily supply rubber. The sparges, sow-thistles, lobelias, and many other common plants met with in this country yield enormous quantities of latex; similarly in the tropics species of *Euphorbia*, *Carissa*, *Plumeria* and others squirt out volumes of white or yellowish latex when cut. The percentage of caoutchouc in most of these plants is, however, so small as to render their exploitation unprofitable.

CAOUTCHOUC PERCENTAGE OF SPECIFIC VALUE.

Another point of importance is that when one considers species of the same genus it frequently transpires that though they all contain latex having caoutchouc in perceptible quantities, only some of them possess the requisite percentage of caoutchouc from the commercial stand-point. For instance, the genus *Funtumia* includes two species, *F. africana* and *F. elastica*, containing latex; but rubber cannot be extracted in paying quantities from the former, though the latter has long been known, as the source of Lagos silk rubber. In this case, therefore, one can identify the species mentioned, *F. elastica* always giving a high percentage of caoutchouc, but *F. africana* never. In a similar, though less definite, way one can associate a certain range in chemical composition of latices from species of *Palaquium*—one of which yields guttapercha—or even of *Hevea*, *Manihot* and *Castilloa*.

A suggestion was at one time made that the ash constituents were also an indication of the botanical origin, lime being characteristic of *Hevea*, magnesia of *Manihot*, and iron of certain African rubbers.

DIFFERENCES OF STRUCTURE.

The actual vessels or channels wherein this variable mixture is contained exhibit features of an equally variable nature. Yet it is upon their anatomy and distribution that most schemes of tapping, not only in point of distance between tapping lines and frequency of tapping, but also in the kind of implement used, have been based. The most frequent type on rubber plantations is that termed the "articulated" form of latex vessel. It is to be found in *Hevea* and *Manihot*. In this group the latex vessels are formed by the breaking down of the walls of the cells of the bark in such a manner as to lead to the production of an irregular channel with the remnants of the original cell walls as its sides. Out of a series of regular bark cells a definite channel is ultimately formed, which subsequently becomes charged with latex. This decomposition is taking place every hour in every *Hevea* tree on plantations so long as the bark is in a living state. If the tree is so badly tapped as to prevent the regular production of bark, then the source of future latex tubes, and therefore of rubber, is gone.

The second type of latex vessel, the "non-articulated," is to be found in *Ficus* and *Castilloa*. Here there is no decomposition necessary. In the embryo of each *Ficus* or *Castilloa* tree the latex vessel consists of a tube which begins, at an early period, to throw out branches in all directions, which ramify throughout the young plant. This non-articulated system pushes its way between the existing cells of the bark without effecting any decomposition. It is nothing more than a much-branched tube, with numerous growing points.

In the third type, exemplified in *Palaquium*, the latex is accumulated in local groups of bark cells which are not connected with one another.

INFLUENCE OF TYPE ON DISTANCE.

The foregoing statement will indicate that the most open communicative type is the non-articulated. An incision of the same size drains a far greater length of latex tubing in *Ficus elastica* than in the disconnected articulated type of *Hevea brasiliensis*. Therefore the distance between the tapping lines must be widely different, and also the interval of rest between successive tappings. The greater the area drained by a given incision the longer the interval that must be allowed in tapping operations. In the Palaquium type the disconnected groups of latex cells must be tapped on an entirely different plan in order to get the latex from each group of cells the tapping lines must be very close to one another, in fact all over the surface of the tree.

DECOMPOSITION SERIES BEST.

Where incision only is practised it is clear that the distance between the tapping lines is determined by the type of latex vessel; where, however, paring is regularly adopted, other factors come into consideration, the chief being the process of formation of the latex vessels. In the articulated type of *Hevea* and *Manihot* the decomposition of cell walls is going on at all times: so long as new bark is produced new lactifers will form. This is by no means the case in the other series, where once the latex tubes are drained an interval must be allowed in which the same structures originally tapped can become refilled with latex. It would thus appear that the salvation of *Hevea brasiliensis* depends entirely on this process of decomposition being continued throughout the life of the plant. It is remarkable that at the present time only those plants which have this type of latex vessel are proving successful under cultivation. It would, therefore, be advisable to bear this point in mind whenever any "new species" of rubber yielding plants is placed before the planting community.

Pink Disease in Java.

"Pink disease," caused by *Corticium salmonicolor* B. and Br. (*Corticium Javanicum* Zimm.), has long been known in Java under the native name of "Djamoer-oepas," and has engaged the attention of the Scientific Department from time to time during the last twenty years. Zimmermann gave a full description of the disease, particularly as it affects coffee, while Zehntner, Wurth, and Bernard have dealt with it on other cultivated products. Now appears another paper on the same disease, chiefly in its relation to cinchona, by Dr. A. Rant, the Botanist of the Java cinchona plantations.

Dr. Rant enumerates 141 species of wild and cultivated plants which are known to be attacked by this disease. To this list another can be added, for the fungus has recently been found on Camphor (*Cinnamomum camphora*) in Ceylon, a host which is not given by Rant. It is interesting to note that it occurs on Cacao in Java, while there is no record of pink disease on that plant in Ceylon.

Dr. Rant's paper is an excellent contribution which clears up many doubtful points and rounds off in a masterly manner the work of previous investigators. Seeing that the fungus has been recorded on so many different plants, he set himself the task of discovering whether all these fungi were really the same species, and, if so, whether there existed any "biologic" forms. In other groups of fungi, e.g., the *Uredineae* and *Erysiphaceae*, it has been proved that fungi which are morphologically indistinguishable yet differ in their ability to attack closely related plants. Marshall Ward, for example, proved in the case of *Puccinia dispersa*, which was

supposed to attack all species of *Bromus*, that the fungus on *Bromus sterilis* would not infect *Bromus mollis*, while that on *Bromus mollis* could only rarely attack *Bromus sterilis*; and similar cases have been demonstrated by Eriksson. Again Marchal pointed out that the conidia of *Erysiphe graminis* on wheat are not able to infect common barley, oats, or rye; and in this group further instances of this specialised parasitism have been discovered by Salmon. These discoveries have led to the conception of "biologic" species, *i.e.*, species which are morphologically exactly alike but are not able to infect the same plants. The application of this to the present case is obvious. The fungus which causes Pink disease on Hevea is indistinguishable from that on tea, or orange; but if these three proved to be biologic species infection of tea by the fungus on Hevea would be impossible. Unfortunately, Dr. Rant has proved the contrary: with one possible exception, his experiments have shown that biologic species do not exist in *Corticium salmonicolor*, or, in other words, that the fungus on any of its host plants may transfer itself, to any other. To put it briefly, Dr. Rant set out to show, if possible, that the disease was not so bad as it appeared, but he has been forced to conclude that it is all that was claimed for it, and indeed rather worse.

Corticium salmonicolor was known to occur on affected trees in three forms. The typical form is a thin, continuous, pink sheet which becomes cracked in all directions and changes to a yellowish tint when old. In very damp situations, it often takes another form, running over the surface of the cortex in a thin felt of long silky hyphae, usually white or silvery. The third form consists of minute pink cushions, usually elongated vertically, in small cracks in the bark: in Ceylon, the first formation of these cracks, before the pink cushions have appeared, has been styled the "measles" stage. Dr. Rant has, by suitable cultivations, provided the scientific proof that these three forms are, as was supposed, stages of *Corticium salmonicolor*: and moreover he has proved that another fungus, which was originally found on Coffee in Malaya and named *Necator decretus* by Massee, is really a fourth form of the same *Corticium*. The latter form has not yet been recorded from Ceylon.

One important new fact demonstrated by Dr. Rant is the existence of the mycelium in the wood of the affected plant. By suitable methods, he was able to develop the fungus in pure culture from the mycelium in the wood and to reproduce the disease by inoculations from the pure culture. It follows from that, that merely scraping off diseased bark is insufficient to eradicate the fungus.

In the matter of treatment there is little news to be recorded. The old method of cutting off and burning the diseased parts is recommended, with the caution that burying is insufficient. Treatment of *already diseased trees* with fungicides is deprecated, since they cannot kill the fungus in the wood. Carbolineum proved ineffective on Cinchona, but its effect on tea appeared to be somewhat better.

It is surprising to find that Dr. Rant makes no reference to the successful experiments in preventing the attack of pink disease on Hevea in South India by the use of Bordeaux mixture. The results have proved most satisfactory; and, seeing that they have been reported on several occasions in the *Planters' Chronicle*, some knowledge of them should by this time have reached Java. Fortunately, the disease has not been serious enough in Ceylon to warrant the adoption of that method of prevention,—*T. Petch in the Tropical Agriculturist.*

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THE U. P. A. S. I.

(INCORPORATED.)

Nineteenth Annual Meeting.

The Nineteenth Annual Meeting opened at Bangalore on 12th August, 1912, the following being present :—

CHAIRMAN	...	...	...	MR. C. E. ABBOTT.
SCIENTIFIC OFFICER	...	...	...	MR. R. D. ANSTEAD.
SCIENTIFIC ASSISTANT FOR MYSORE	...	...	...	MR. G. N. FRATTINI.

Delegates.

<i>Anamalais</i>	...	...	...	{ MR. J. H. ROBINSON. MR. C. MARSH.
<i>Bababudin</i>	...	...	...	{ MR. N. G. B. KIRWAN. MR. G. R. OLIVER.
<i>Central Travancore</i>	...	...	...	MR. H. C. WESTAWAY.
<i>Coorg</i>	...	...	...	{ MR. J. GRAHAM. MR. E. L. MAHON. MR. W. M. BALL.
<i>Kanan Devan</i>	...	...	...	MR. E. A. HUGHES.
<i>Malabar Coast</i>	...	...	...	MR. H. C. PLOWDEN.
<i>Mundakayam</i>	...	...	...	MR. G. DANVERS DAVY.
<i>Nilgiris</i>	...	...	...	{ MR. E. F. BARBER. MR. C. H. BROCK. MR. J. S. NICOLLS.
<i>North Mysore</i>	...	...	...	MR. W. H. REED.
<i>South Mysore</i>	...	...	...	{ MR. M. J. WOODBRIDGE. MR. F. M. HAMILTON.
<i>Shevaroy</i>	...	...	...	MR. C. DICKINS.
<i>South Travancore</i>	...	...	...	—
<i>Wynaad</i>	...	...	...	{ MR. C. E. ABBOTT. MR. J. S. NICOLLS.

Visitors.

Sir Hugh Daly, K.C.S.I.	Mr. H. Cardozo.
Mr. G. H. Krumbeigel.	Mr. W. Rankin.
Mr. L. King-Church.	Mr. C. G. Maclean.
Mr. G. W. Denne.	Mr. L. G. Meldrum,

and Several Ladies.

AGENDA PAPER.

MONDAY, AUGUST 12.

1. Annual Report and Statement of Accounts.
2. Chairman's Address.
3. Work of the Planting Member.
4. Scientific Officer's Report.
5. Weights and Measures.
6. Roads and Communications
 - (a) Railways.
7. Legislation—
 - (a) Prevention of Thefts of Tea, Rubber, (Travancore) &c.

TUESDAY MORNING, AUGUST 13TH.

8. Finance.
9. Planters' Benevolent Fund.
10. *The Planters' Chronicle*.
11. Office and Establishment.
12. Scientific Department—
 - (a) Laboratory.
 - (b) Library.
 - (c) Staff.
 - (d) Assistants
 - (e) Bulletins
 - (f) Contingencies
 - (g) Programme for 1912—13.

TUESDAY AFTERNOON,

13. Coffee—
 - (a) Experiments
 - (b) Hybridisation.
 - (c) Bees
 - (d) Quality and Curing
 - (e) Markets
 - (f) Adulteration.

WEDNESDAY MORNING, AUGUST 14TH.

14. Agricultural Matters—
 - (a) Tea Cess.
 - (b) Pests and Diseases.
 - (c) Fertilisers.
 - (d) Export Duty on Bones.
 - (e) Cultivation.
 - (f) Products.

15. Rubber—
 - (a) The International Rubber Exhibition, 1911.

WEDNESDAY AFTERNOON.

16. Duties—
 - (a) Proposed Coffee Cess and Popularisation Scheme.
17. Tea—
 - (a) Markets.
 - (b) Green.
18. Labour—
 - (a) Recruiting and Emigration.
 - (b) Enticement of Advanced Labour to emigrate.
 - (c) Non-Service of Warrants.

THURSDAY, AUGUST 15TH.

19. Alteration of Rules.
20. Election of Office-bearers for 1912-13.

The Chairman's Opening Address and the Annual Reports of the Secretary and the Scientific Officer follow :—

The Annual Report of the Secretary, 1911-12.

GENTLEMEN,—Having only assumed office as your Secretary at the eleventh hour, I must claim your kind indulgence for its shortcomings and omissions.

I regret that I have to open my report by having to record the death of Mr. Trevor Roper, whose loss has occasioned deep regret amongst a wide circle of friends.

A number of invitations have been sent out to those interested in our various products, the majority of which have been accepted and we have to welcome many visitors.

A vacancy having occasioned on the Indian Tea Cess Committee on account of Mr. Romilly having gone to England, Mr. Carson Parker has been elected to fill it.

A portrait of Mr. Ackworth, who at various times was your Chairman and Planting member and occupied those positions with conspicuous ability has been added to our gallery of those who have filled those positions.

I may mention that a small exhibition of products by members of this Association and others, including some coffee pulping machinery is being held at the Office of the U. P. A. S. I. This will be open from the morning of the 12th August.

The *Planters Chronicle* has, since the beginning of this month, become the property of the Association and will continue to be the chief medium to bring matters of interest to the planting community to the individual planters and it is to be hoped it will continue to receive the support of every member.

THE SCIENTIFIC OFFICER.—The personal strain of the past two years on this office, has been relieved to a certain extent by the advent of Mr. Frattini, Assistant Scientific Officer, who has taken up his duties in Mysore and this strain will be further decreased when Mr. Jonas, Assistant Scientific Officer, who has been engaged for Coorg, arrives, which will be about the middle of October. Those invaluable papers published in the *Chronicle* and of such interest to you all, will, I hope, be largely increased as Mr. Anstead finds more time at his disposal.

THE EXPERIMENTAL PLOT.—The Scientific Officer reports that work has commenced and is in progress on the plot of land granted by Government and Rs. 50 has been spent up to date leaving a balance of Rs. 265 and it will be necessary to call on the guarantors during the course of the year for subscriptions.

LABOUR.—During the past year printed and illustrated circulars in different vernaculars have been distributed with beneficial effect and has shown the would-be emigrant coolie that well paid and regular labour is to be found at his door, instead of severing himself for years from home ties, but members should remember that there is still much to be done, for besides Ceylon competing in the Labour market you have Assam recruiting at your very doors and paying very large advances per head. Members should not relax their efforts to stem the tide of emigration.

ROADS AND COMMUNICATIONS.—In Mysore considerable activity is being shown in the matter of railways. Mr. Bell, the well-known Railway

expert has been appointed Consulting Engineer for Railways to the Government of Mysore and many surveys are being undertaken with a view to linking up the country with the main line. I especially bring this to the notice of the Coorg Association. Though the Arsikeri-Mangalore Railway, so long agitated for, does not at present appear feasible, the whole subject of railways in planting districts should constantly be kept before the Railway Board through this Association.

PEST ACT.—The Government of India nominated a Committee, of which your Scientific Officer, Mr. Anstead, had the honor to form one to enquire into this matter. The suggestion arrived at by this Committee are of a confidential nature and are under the consideration of the Government.

THE INTERNATIONAL RUBBER EXHIBITION.—The accounts have been closed. The total subscribed was Rs.5,060-13-5 of which Rs.3,499-12-4 was spent and the balance Rs.1,561-1-1 was returned to the subscribers in the proportion of 2 annas 4½ pies for each rupee originally received.

ACCOUNTS.—A new system of accounts has just been introduced which has simplified these; they have been audited and certified as correct; and I beg to lay them on the table but before concluding would draw your attention the comparisons of the estimates.

Estimate 1911-12.				Actual.			
Receipts	Rs.7,961	0	3	...	Rs.8,694	4	8
Disbursements	Rs.8,935	0	0	...	Rs.8,126	11	2

This shows a small profit of Rs.567-9-0.

The Chairman's Opening Address.

GENTLEMEN,—You have heard the Secretary's report on the working of the Association for last year read. It is shorter than usual partly because Mr. Norton has only just taken charge of the Secretary's Office and partly because this has fortunately been a year of quiet progress in planting matters.

FINANCE.—The first subject that ought to be dealt with at this Meeting is the Budget. It is usually postponed to the closing day, always, I think a bad plan. Last year the result of doing so was specially pernicious. Some members had left Bangalore, the remainder were tired out. After a long discussion we agreed to temporarily take the last of the "Reserve Fund" in order to increase the Secretary's salary and to invite District Associations who had not joined the scheme for providing Assistant Scientific Officers to raise their subscriptions for all purposes to 2 annas per acre. A Circular was issued in accordance with this resolution. I asked the Editor of the *Planters' Chronicle* to publish it and the replies received. He objected to do so. The consequence is that subscribers generally are in ignorance of what has been going on. It may be said shortly that though some Associations subscribed the extra money for a year, on condition that a full enquiry was held into U. P. A. S. I. Finance, others declined and some postponed the question. So throughout the year your Finance Committee, in addition to other worries, has been in ignorance of what money it had to work with. I need not go further into the question now.

PRODUCTS.—Our principal products have done well in the past year and will, I hope, continue to do so.

The price of coffee has been higher than for some years. that of rubber though below its highest, continues quite satisfactory to its growers as is

witnessed by the extensions that are going on in South India and elsewhere. The market for Tea continues firm. A subject that has been brought before us for consideration this year is that of the unfair pushing of China Tea in the United Kingdom by advertisements animadverting on the deleterious qualities of the Indian and Ceylon product. Apparently the high price of the latter has led some traders to stock cheap China Tea, and, as their customers did not like it, they took up the line American dealers did in competing with the Indian Tea Cess Commissioner. The competition of the China article is not serious so far as only 14 million lbs. of China Tea went into consumption in the United Kingdom as against 257 million lbs. of India and Ceylon and 21 million lbs. of Java Tea.

The question of renewing the Tea Cess will come up for discussion, and the general feeling among planters appears to be in favour of going on paying it. Mr. Parker our representative on the Cess Committee, went near to converting that body to paying a bonus on the export of Green Tea.

We have to thank the Editor of the *Madras Mail* for publishing telegrams about the prices of Indian Tea in London throughout the year.

SCIENTIFIC DEPARTMENT.—This has been an important year for the Department as two Assistants have been appointed to help Mr. Anstead one by the Mysore Association and one by Coorg. Mr. Frattini has already taken up his work, and Mr. Jonas will be in India by the middle of October. We have to congratulate the Associations concerned on their enterprise. I was glad to see that the Kanan Devan Association has decided to join the Scientific Officer Fund, so now all the Associations belonging to the U. P. A. S. I. are subscribers.

Mr. Anstead has had a busy year: he will read you his own report. Personally I have to thank him for a great deal of assistance given most ungrudgingly outside his own special work.

LABOUR DIFFICULTIES.—Conditions vary so much in different districts that it is not much use making general remarks drawn from experience in one of them.

Our Vice-Chairman, Mr. Martin, whose absence, we all regret, composed an advertisement showing that coolies could do just as well in South Indian Planting Districts, as they could by crossing the sea and that there was regular and well paid work to be obtained close to their own villages.

The draft advertisement was circulated to all associations and was finally adopted and printed by the U. P. A. S. I. which accepts the responsibility. I saw in the *Madras Mail* that one Ceylon Association appeared to object to something in this advertisement. Since then the Central Ceylon Association has instructed its Labour Commissioner to enquire into the matter. Should any communication be received from the Ceylon Planters' Association we can enquire what particular statement is objected to. I believe there is nothing in the publication that is not absolutely correct.

As I have said before, South Indian and Ceylon Planters have no quarrels: they have been recruiting very peaceably side by side for a number of years. What trouble there is has arisen from the fact that Ceylon planters who have moved further East wanted the same class of coolies that they had been accustomed to in the Island, and believed that a couple of districts in South India could afford an inexhaustible supply.

MILITARY PENSIONERS.—A letter has been received from Colonel Monck Mason, Paymaster of Pensioners at Fort Saint George, inviting us to employ Military Pensioners, both European and Native, on Estates.

Members of my own Association were willing to employ a certain number of ex-Sepoy on special works such as Factory watchmen, cart drivers, gardeners or assistant engine drivers on regular pay of from Rs. 10 to Rs.12 a month. We believed that the conditions in Wynaad were hardly suitable for European Pensioners. But I promised to bring the subject forward here as some Delegates might be able to employ European ex-soldiers in positions of trust. Colonel Monck Mason's letter can be seen by anyone interested.

GENERAL.—I think I have alluded to all the subjects that require special mention.

Mr. Ormerod's resignation came at an inconvenient time, and we will all regret losing the services of one who has been Secretary for so long and done excellent work for us in past years. I believe we have got a good man to succeed him.

Our Planting Member, the Hon'ble Mr. J. G. Hamilton, is unfortunately unable to be present having had to leave India on account of his health. We all hope that the change will completely set him up. The election for a representative of this Association in the Legislative Council takes place in November, and Mr. Hamilton suggested that we should get a candidate or candidates nominated at this Meeting: so I had a circular sent out asking you to be prepared to do so. The names put forward have to be ballotted for by District Planters' Associations.

When I was returning—thanks for the honour that was done me in electing me to be your Chairman for the second time—I urged those members of District Associations who objected to anything that was done here, or to the line of policy in any particular instance not to stay at home and grumble, but to come here and explain their views. I have been told that the form of my remarks on the subject was somewhat crude and truculent. I said do not say you "won't come to Bangalore to hear that fool talk, come hear and tell him he is a fool."

It is difficult to be polished and elegant on the spur of the moment unless one has been brought up to it: but what I meant was plain enough. This Association has now been in existence for 18 years and has done a great deal of useful work for the community it represents. Its Founders had a far more difficult task to perform than those who started similar Central Associations in Ceylon and Malaya where planting districts are close together, and planters represent the principal industry of the Colony. Here we are in a minority scattered over half a continent. That our main interests are identical is proved, if proof were needed, by the continuous support the U. P. A. S. I. has received from District Associations. But there must be details in which our wants differ to some extent, and occasions on which the decisions come to here may appear even harmful to some individual planter. These Annual Meetings afford such men the opportunity of explaining their views to their fellow-planters and of discussing the subjects that interest them. It is a mistake to imagine, if anyone does imagine, that it is no use for a man whose opinions differ from the majority of delegates to come here. He will probably find supporters from the first. In any case he will be carefully listened to. He may even hear arguments that will modify his own views.

One remark that I made last year needs no qualification. I said I was sure that I should have the willing assistance of the Vice-Chairmen and Secretaries of District Associations. It has been rather a trying year and has involved a good deal more work than I expected. Without your constant assistance, Mr. Barber, and without the sympathy and confidence of all the Councillors I could not have carried on. I am very heartily grateful to all of you.

Annual Report of the Scientific Officer.

1ST JULY, 1911 TO 30TH JUNE, 1912.

MR. CHAIRMAN AND GENTLEMEN,

I have the honour to present to you my Third Annual Report as Planting Expert and Scientific Officer to the U. P. A. S. I. This report, as in former years, is only a summary of the work done during the year under review, and detailed discussion of pests, diseases, manures, &c., will be dealt with under their separate headings on the agenda paper.

OFFICE AND CORRESPONDENCE.

My office staff throughout the year has consisted of one writer and one peon, and the up-keep of this staff is met by a contribution from the Government of Madras.

The office work has again shown an increase during the year, the number of letters received being 710 as compared with 536 last year, and the number of letters written being 642 as compared with 534 last year. The large majority of the letters received continue to be from planters asking for advice about manuring, cultivation, pests, &c., &c., and they have all received my personal attention, so that correspondence continues to take up a large portion of my time when I am at head-quarters. With so large a district to work over much must necessarily be done by correspondence, and I venture to think that the increase in this section of the work is an indication that your Scientific Department is becoming an increasingly useful bureau of information.

THE PLANTERS' CHRONICLE.

I have contributed regularly to the pages of the *Planters' Chronicle* which has been issued as a weekly throughout the year, and I have written for it 35 papers and 45 notes as well as miscellaneous items.

At the last Annual Meeting it was decided that Bulletins should be published from time to time by the Editor of the *Planters' Chronicle*. In accordance with this one Bulletin dealing with the subject of 'Pink' disease of Hevea Rubber and Bordeaux Mixture has been published. Changes in the Secretaryship have prevented the publication of any further Bulletins but it is hoped to get out several more during the coming year.

HERBARIUM AND COLLECTIONS.

Little work has been done on these during the year for want of time. The collection of Leguminous Plants suitable for green dressings and cover crops has been added to to some extent, and about fifty sheets have been added to the general collection in the herbarium. My thanks are again due to Dr. Barber, the Economic Botanist to the Government of Madras, stationed at Coimbatore, for his kindness in checking determinations and naming plants from herbarium specimens sent to him.

A miscellaneous collection of insects was made during the year and these were handed over to the Imperial Entomologist for naming, and they will find a place in the collections at Pusa and Coimbatore.

TOURS.

During the period under review I have visited the following districts in the order named :—Shevaroy's, Coorg, Anamalais, North Mysore, and Coorg for the second time to inspect a special disease. I had the pleasure of being accompanied on the Anamalai tour by the Imperial Entomologist who was collecting insects.

I also attended the Mysore Dasara Industrial and Agricultural Exhibition held at Mysore City in October, and arranged, and took charge of, the U. P. A. special Exhibit. A very good show, especially of coffee and rubber, was got together and displayed in a separate building. The exhibit of rubber was probably the most complete and extensive which has ever been shown in India, and it elicited a great deal of interest and attention. A refreshment room was run in connection with our exhibition at which South India Tea, and Mysore and Coorg Coffee were supplied and sold, and our thanks are due to Messrs. Spencer & Co. for the aid they afforded us in this connection. A Gold Medal was awarded us for our Exhibit which may be said to have been an unqualified success, but I am doubtful whether it paid from a business point of view, or whether it is worth while to repeat the experiment for the present. The expenses of the Exhibition were met by a special grant from the available Rubber Exhibition Funds.

In November I went to Pusa to attend a Meeting of a Special Committee appointed to consider the question of the introduction of insect pests and diseases through the importation of foreign plants of which I had the honour to be made a member.

This question bears upon the subject of a Pest Act and is a most important one, and very closely affects the welfare of the planters of Southern India. The Committee went into the matter in great detail and made certain recommendations to the Government of India which are at present of a confidential nature.

After the Committee Meetings had finished I stayed at Pusa, by special invitation, to attend the Meeting of the Board of Agriculture.

These tours have necessitated my being absent from Head-quarters for 76 days during the year, and travelling a distance of 6080 miles by rail and 757 miles by road.

During my tours in the planting districts I was able on several occasions to attend meetings of the District Planters' Associations and to deliver several lectures. I should like to take this opportunity of expressing my thanks to the Honorary Secretaries of the District Planters' Associations concerned for the arrangements they made for me, and to all those who have so generously afforded me hospitality and transport facilities, and helped me to make my tours easy and successful.

It will be seen that during the period under review I have toured less than in past years and so have been able to devote more time to research work in the laboratory. This, I think, is as it should be, as I have been over most of the districts under the U. P. A. S. I., and I am now familiar with their varying conditions, and little more can be done than has already been done by visiting estates.

As pointed out in my report last year, I have given all the advice which it is possible for me to give from a casual inspection of estates, and it is impossible for me to do more when my visits are confined to a few weeks in each district, much of the time being taken up in actual moving from

place to place. I can now give just as good advice from my office as I could on the estate upon points which do not need field study. To see the same disease, or pest, over and over again on different estates and in different districts year after year is of no use. In such cases study on the spot by a man living and working in the district is what is needed, and it is far better that I should be allowed to stop at head-quarters and direct such a man, and devote myself to some special problems of general interest such as soils, and manures, &c., which can be worked out in the laboratory.

I would again suggest that I should be allowed to work at head-quarters for the greater part of the year, and that my touring be confined to one or two districts only each year so that I may tour at leisure, and spend more time in the districts visited.

SCIENTIFIC ASSISTANTS.

Two districts, Mysore and Coorg, have shown themselves in agreement with these views by appointing Assistants to reside in their districts and carry out work in them under my direction.

Mr. G. N. Frattini was appointed Scientific Assistant for Mysore, and arrived in Bangalore on 6th May 1912, and after spending a few days at head-quarters he went to North Mysore and began work.

Mr. L. G. Jonas has been appointed Scientific Assistant for Coorg and is expected to arrive in the country about the middle of October next.

While research work is undoubtedly needed, field work is also a necessity if the utmost possible benefit is to be obtained from your Scientific Department, and it is obvious that it is impossible for one man to do both over even a small part of such a big field as is controlled by the U.P.A.S.I.

These assistants will live and work in the districts employing them, and they will carry out investigations in the field and do the necessary field work to back up and amplify the work done in the laboratory. They will be able to make a special study of the conditions and needs of their districts and to interpret general advice, such as I am able to give, into particular advice for the district concerned.

They will also be able to conduct and carry out experiments, a most important part of any scientific work and one from which all final and definite knowledge in agriculture comes.

Research work in the laboratory gives indications that such and such procedures are probably the best, but these must be tested in the field. Two men are needed, one to study and suggest, the other to test and turn the suggestions into practical estate processes. Both should be in close co-operation constantly discussing results and adjusting details. The field man will constantly need analyses made and will be able to suggest new ideas and lines for study, and only by such a combination can real advance in knowledge be arrived at.

MANURING AND EXPERIMENT PLOTS.

In my last report I gave a list of proposed experiments which were said to exist in different districts. Many of these, I regret to say, have not been heard of since and exist only on paper. So long as there is no Assistant in the district to look after these experiments, and actually see that they are carried out, and make himself responsible for them, this is bound to happen. I strongly advise all the districts, or groups of districts, which

belong to this United Association to follow the example of Mysore and Coorg and appoint Assistants. More especially I beg to offer this advice to that great group of districts interested in growing rubber. What they need is a chemist to live and work in the district, and to carry out experiments in a systematic and scientific way with methods of manuring rubber and methods of tapping and manufacture. Such a man should have a small laboratory at his disposal attached to one of the big factories where he could work on these special problems while the analyses and study of soils and manures, &c., and possibly of final products, could be done at Bangalore in my laboratory. By co-operation and help of this sort I feel sure much benefit would accrue, and South India would take its place in the front rank of those who are daily making new discoveries and learning to improve and cheapen the output of rubber against the coming of a synthetic rival, instead of being content, as at present, to follow some way behind and plod along with the mistakes that others have abandoned.

In this connection I would quote Mr. Herbert Wright who, in his last lecture at the Imperial College of Science, said that while one white man was provided to supervise every 300 acres of rubber for tapping and cultivation, only one mycologist was provided for 220,000 acres of Hevea in Ceylon, and two for 400,000 acres in Malaya. It was impossible, he said, for one plant sanitation officer to deal with anything like such an acreage. He regarded the paucity of scientific officers on rubber estates as one of the gravest errors of their administration, and he appealed to private companies and Government to tackle the problem now while diseases and pests were in their infancy.

I would appeal to South India where we have some 30,000 acres or more of Hevea with no mycologist, and some 120,000 acres or more of cultivation under the aegis of the U. P. A. S. I. with, until a few months ago, only one Scientific Officer.

Accounts of the experiments which have been conducted during the year have been published in the *Planters' Chronicle* from time to time. The most important have been the following:—

1. Manurial Experiments with Coffee.

Several of these have been begun and they are mainly devised to test the value of Nitrolim, and to illustrate the benefit of a manurial system. With the advent of the Scientific Assistants, and the proposed co-operation of the Kalisyndikat, these manurial experiments will be developed and multiplied in Mysore and Coorg during the coming year.

2. The quantity of Mulch deposited from shade trees and its manurial value.

This experiment is being continued as a manurial one to ascertain how far the Nitrogen in the Mulch is sufficient for the needs of the Coffee.

3. The Conservation in pits of composts of pulp and line sweepings.

Experiments with these composts were made in several places and some of the results obtained will be reported at this meeting.

4. Leguminous green dressings for Coffee and Tea.

A number of different plants are being tried, but more systematic experiments are needed which will provide figures for comparison.

5. The effect of fertilisers on the latex yield of Hevea Rubber.

This experiment was carried out in Mundakayam and, though not very conclusive, indicated that an application of Sulphate of Ammonia at the rate of half a pound per tree materially increased the yield of rubber, and gave a profit of about Rs. 10 per acre. Nitrate of Soda also produced an increased yield.

6. Manurial Experiments with Hevea rubber.

These experiments were carried out on Periyar Estate and a general well-balanced manure proved the most suitable. The experiments appeared to show that it was useless to apply any manure without an analysis and a good knowledge of the soil upon which to base it.

7. Pollarding Hevea Rubber as compared with cutting out when thinning becomes necessary.

Also conducted on Periyar Estate. The experiment showed that cutting out every alternate tree was the best method of thinning a thickly planted field.

8. The use of Arsenite of Soda as Weed killer.

Experiments with this weed killer were carried out in Coorg in Ceará Rubber. The conclusions arrived at were that the best means of getting the best results were :—

- (a.) In high grass to spray first and cut down before the second application.
- (b.) In grass about two feet high it is cheapest to rough grass-knife the place first and then spray twice.

The experiments are being continued in order to ascertain :—

- (a.) The minimum number of sprayings a year necessary to get a place clean and keep it clean.
- (b.) Whether it is cheaper to do this by using Arsenite of Soda or by ordinary weeding methods.
- (c.) Whether the minimum application will in the long run do any harm to the permanent crop.

The Kalisyndikat of Berlin have offered to give a grant to enable certain manurial experiments to be carried out during next year in Mysore and Coorg under the management of the Scientific Assistants and myself. Their proposal will come before you during this meeting and I beg to recommend that it be accepted.

Work on Coffee Hybridisation was continued during the year. A hybrid of *Coffea arabica* and *Coffea liberica* is being experimented with, the object being to endeavour to produce a plant which will be disease resistant, and have an increased yield.

A number of such hybrids are now planted out on estates in different districts and are giving decidedly good results. On one estate a single hybrid was found to give a yield of seven pounds of clean coffee and a sample of this was valued in London at 76s. to 78s. per cwt.

A plot of land in the Nilgiris has been granted to the United Planters' Association of Southern India for the purpose of the study of Coffee hybridisation to be carried out by the Planting Expert and the Curator of the Government Gardens, Ootacamund. This plot has been cleared and planted up with a number of varieties of Coffee and with some hybrids of known character. Work will be conducted on 'Mendelian principles and by selection

and crosses made between *Coffea arabica*, *Coffea robusta*, *Coffea stenophylla*, and 'Marigogipe' and the resulting hybrids studied. The expenses incurred in connection with the work are being met by the U. P. A. S. I.

LABORATORY.

As less time has been devoted to touring a certain amount of laboratory work was undertaken without fear of interruption, and a number of analyses were made. Much of the work begun during the year under review relates to investigations which are still in progress.

Analyses were made of samples of Mulch collected each month of the year from a measured area of Coffee on a Mysore estate, and an idea of the manurial value of this mulch was thus arrived at. It was found that something like four tons dry weight of mulch fall each year on an acre of Coffee under average shade, and that this mulch contains over 100 lbs. of Nitrogen. This interesting result must be taken into account in any rational system of Coffee manuring.

Samples of two new fertilisers have been examined during the year. The first was a high grade Fish Manure, and this has been reported upon in the *Chronicle*. The second was a phosphatic manure of the nature of Basic Slag known as 'Bernard Phosphate' and the report upon this is ready for publication.

Several leguminous green dressing plants have been analysed and an idea of their value as fertilising agents obtained. This work will be continued from time to time and the Scientific Assistants will carry out field trials in an organised way with a number of common leguminous plants.

Among investigations still in progress the following are the most important :—

An examination of the Limestone deposits from different districts in South India has been begun to ascertain whether a cheaper source of Lime than Shells at the Coast cannot be found for certain planting centres. This work is still incomplete but it is hoped to shortly be able to publish part of it with certain recommendations.

An investigation of the use of Coffee Pulp and the making of Composts with various materials on the estate is in progress. The first part of this work will form the subject of a lecture at this Meeting.

An investigation of the composition of Coffee Berries in progressive stages of development has been started, with the idea of possibly gaining a clue to the best time of the year at which to apply different fertilisers to Coffee.

An investigation of certain soils in Coorg and the Anamalais which afford special problems of cultivation and manuring is being carried out.

It is hoped that during the coming year time will be allowed to continue these investigations and undertake new ones which may suggest themselves, or be put forward by planters and the Scientific Assistants.

In conclusion I desire to record my very grateful appreciation of the kindly and sympathetic assistance I have received from Mr. Ormerod, the late Secretary of the U. P. A. S. I., not only throughout the past year, but over the whole period during which I have been associated with him. We have worked very closely together during the past three years and I owe much to his courtesy and kindness, and it was with a keen feeling of regret that I heard of his resignation.

RUDOLPH D. ANSTEAD,
Planting Expert.

Coffee Pulp and Composts.

Last year at the Annual Meeting I had the honour to address you on the subject of the use of 'natural manures' on the estates, and I pointed out that every estate supplies a certain amount of what may be called 'natural manure' in the nature of waste products which when fertilisers can be purchased cheaply it is perhaps not worth while to pay much attention to, but when fertilisers reach a high price and the crops a low one it is worth while paying attention to these natural resources.

In the case of Coffee there is a considerable quantity of a waste product each year in the form of Pulp and I advised that this should be conserved and made into a compost in a water tight covered pit with lime and yard sweepings, such manure as is obtained from the cattle working on the estate, or visiting it in the transport carts, and the manure supplied by the stables.

On Tea and Rubber Estates, though the Pulp is wanting materials for making a good compost are at hand, factory sweepings, lime and yard sweepings and rough growth cut from waste ground can always be obtained.

During the past year experiments have been made in several places with such composts and I propose to-day to try and show you what can be done in the way of making them, and by the aid of a few analyses which have been made in my laboratory during the year to indicate the value of them. Incidentally I may be able to show you the value of having a laboratory at my command where one can ascertain and follow what is being done on the estate.

I began by investigating the composition of Pulp and the effect of the usual estate methods of treating it. I will now ask you to look at the Table of Analyses before you and I must here explain that Pulps and composts always contain a large amount of water, and this is a variable amount, so in order to be able to compare one sample with another the composition of the *dry matter* only in the different manures is given. The water factor will be considered later on.

In the first column of the Table you will find an analysis of fresh Pulp as it comes from the pulper calculated to a dry condition and if you compare it with the analysis of Indian Cattle Manure made by the Box System (which gives the best results) also calculated to a dry condition which is given in column 4, my first point will be clear, *viz* that

Coffee Pulp is a valuable fertilising material containing a high percentage of Nitrogen and Potash and comparable, when the composition of the dry matter in it is considered, with the best Indian Cattle Manure.

Hence it is obvious to start with that Pulp should be made good use of. Now the procedure on many Coffee estates is to leave this Pulp leaching and rotting in a pit, or in a heap, for six or seven months before it is applied to the Coffee. The result is that it deteriorates as is shown by the analysis in column 2 which was made of a sample of Pulp which had been treated in this way. It will be seen that though the Nitrogen content

increases, owing presumably to the rotting process, Phosphoric Acid and Potash are lost, and more especially the latter, on account of the leaching effect of the rain. This Potash is lost in the drainage of the heap.

Another common practice is to mix Lime with the Pulp some time before applying it. The effect of this is shown by the analysis in column 3 of the Tables. While the Phosphoric Acid content is unaltered a lot of the Potash has again been lost by the leaching process and has drained away while one per cent. of the Nitrogen has been lost largely due to the action of the Lime no doubt.

The object of adding Lime is to neutralise the acidity of the rotten Pulp, but if the Pulp is properly composted it will not be acid, the necessity for the Lime and the resulting loss of Nitrogen is done away with. This brings me to my second point, namely that

Pulp deteriorates considerably in value by being left to rot down in a heap owing to the action of sun and rain and leaching. and it is also reduced in value by an admixture of Lime.

Before passing on to consider the results of our experiments on the proper manner of conserving Pulp, I wish to call your attention to the other figures relating to Pulp in the Tables before you. These are an attempt to estimate the monetary value of Pulp as compared with Cattle Manure and later on with Composts. The values arrived at are arbitrary no doubt but they will suffice for a means of comparison. Pulp is primarily a nitrogenous manure but the Phosphoric Acid and Potash in it must also be taken into account when we come to compare it with composts. I have therefore first of all calculated the value of the dry matter in fresh Pulp in terms of White Castor Poonac which is taken as containing 6% of its dry weight of Nitrogen. A ton of the dry matter in fresh Pulp is equivalent in Nitrogen content to 975 lbs. of Poonac and thus valued at Rs.32-10-0, White Castor being taken as costing Rs.75 per ton.

If the Phosphoric Acid and Potash are allowed for as well as the Nitrogen we may reckon a pound of Nitrogen bought as Ground Nut and Poonac, (its cheapest form) to cost 8 annas a pound of Phosphoric Acid bought in the form of Bone Meal as costing one anna and a pound of Potash, bought as Muriate of Potash, as costing two annas two pies. A ton of the dry matter in fresh Pulp then becomes worth Rs.37-10-0.

Now fresh Pulp as it comes from the pulper contains a large amount of water. The sample we are considering contained as much as 89.5%. Hence it would need in round figure $9\frac{1}{2}$ tons of fresh Pulp to give one ton of the dry material of the analysis, which makes the value of a ton of fresh Pulp calculated to its plant food value Rs.4-3-0.

As fresh Pulp contains all this water it is unsuited for immediate application. It must first be rotted down, and I have shown you that the usual methods by which this rotting process is carried out cause a loss in its value.

The consequence is it must be composted in some way and experiments were made to ascertain the best way of making such a compost. Several mistakes were made which, however, are of value as showing what to avoid in the future. There is little doubt that the method employed has a pro-

found influence on the resulting compost and its effect upon the crop to which it is applied.

On an estate in South Mysore a water tight tank was made of rough cement near the pulper. This tank measured 22 feet in length, $12\frac{1}{2}$ feet in width, and 5 feet in depth, and cost Rs.75.

Into it was put the pulp from 26 tons of Coffee in layers; a layer of pulp covered with a layer of sweepings from the cooly lines, ashes, paddy husk, &c., and this was dusted over with two cwts. of Bone Meal, another layer of pulp put in and so on till the tank was full. This was left to rot down for about eight months. It yielded a little more than 20 tons of compost which was used to manure about 10 acres of Coffee. The analysis of this compost will be found in column 5 of the Tables before you. It was very dry and contained too much earth and stones which took away from its value somewhat.

Its monetary value may be calculated in exactly the same way as was adopted in the case of the Pulp. The value of the dry matter in it is seen to be equivalent to 417 lbs. of White Castor Poonac, or if all the elements of Plant food are taken into consideration it is worth Rs.20 per ton. But it contained very little water, only 3.88% in fact, and herein it differs very considerably from the fresh Pulp which was the basis of it, and it only required 1.04 tons of the Fresh Compost to supply one ton of dry material, so that the value of a ton of the compost as actually applied to the Coffee was Rs.19-3-0, hence it is nearly five times as valuable as the fresh Pulp. The actual cost of making this compost was estimated to be about Rs.4 per ton. The cost of the tank is not allowed for in this estimate as it is an asset and can be used again.

The next experiment was made in the Anamalais where a compost was made in a washing vat in the Pulp house. Into this was put the Pulp from the last two or three days Pulping of the crop together with one cwt. of Bone Meal and the straw and the droppings from the bandy stand in the yard. It was left till it had thoroughly rotted down when it had no smell and looked very nice, and it did no harm whatever to the vat. The analysis of this will be found in column 6 of the Tables and its value is much the same as that made in South Mysore.

In the Bababudins a compost was made experimentally on a more elaborate plan. At the bottom of a large pit dug in the ground 50 bushels of Pulp were spread in a layer about a foot thick; on this were put layers of the following materials in the order named, 6 bushels of Bone Dust, 2 bushels Sulphate of Potash, 75 bushels of jungle soil, $1\frac{1}{2}$ tons whole Fish, 50 bushels Cattle Manure, 6 bushels Bone Dust, and 2 Bushels of Sulphate of Potash. This was repeated six times beginning again with Pulp. This gave about 100 tons of Compost and cost including the labour of mixing Rs.878. The analysis of the resulting Compost after being allowed to rot down for about a year will be found in column 7 of the Tables. It is rather disappointing owing to the fact that during a big storm during the monsoon a spring burst near the pit and leached the manure in it a good deal. A Compost made in this way is probably too expensive to be very practical, but it will be noticed that there is a considerable profit when its value and the cost of making it are taken into account.

Finally another method of making a compost was tried this year. In this method a cattle shed is made use of. Daily the floor is covered with 40 to 80 bushels of coffee husk from dry cherry coffee; over this 2 bushels of Bone Dust are sprinkled. This goes on from day to day for about a fortnight, when it is removed. All the dung and urine from the Cattle is absorbed by the husk. In 15 days about 1,000 bushels of manure are obtained at a cost, including labour, of about Rs. 2-8-0 per ton. The analysis of this Compost will be found in column 8 of the Tables before you. It will be noted that this is a good general manure containing a high percentage of Phosphoric Acid and Potash and very valuable.

In the last column I have repeated the analysis of Indian Cattle Manure made by the Box system with its value worked out for the sake of comparison. This manure is worth about Rs. 17 according to the standard adopted in this Paper.

These experiments which I have attempted to briefly describe to you are only in their infancy, so to speak, and they must be repeated several times before any really definite conclusions can be drawn from them. However, certain indications can be deduced I think of the probably correct methods by which composts should be made. We are aiming at making cheaply with the materials to hand a substitute for Cattle Manure. The nearest approximations have been the composts in columns 5 and 8, so that I think we are justified in concluding for the present that,

- (a) If cattle are available, the compost is best made by spreading Coffee husk, or dry Pulp, daily on the floor of the shed, dusting it with bone meal, and allowing the cattle to trample it with their hoofs and removing it once a fortnight. If not applied to the coffee at once this manure should be carefully conserved in a watertight pit protected by a pandal from rain and sun.
- (b) Where cattle are not available the Pulp should be allowed to drain, and placed in a specially constructed water-tight tank and mixed with Bone meal at the rate of one cwt. per ton of Pulp, and with lime and yard sweepings, and general estate rubbish.

Bone Meal is added in all cases because Pulp is deficient in Phosphoric Acid content. It appears to be uneconomical to make a complicated compost by adding Fish and Sulphate of Potash.

It is hoped to continue these experiments during future years so as to arrive at some definite and practical plan of procedure. I should welcome experiments with similar composts made on Tea and Rubber Estates where Pulp is not available, with factory refuse, lime sweepings, etc.

In conclusion my thanks are due to those planters who have carried out those experiments and who have kindly supplied me with the material for the analysis before you to-day. This paper is intended to be a progress report only and a brief sketch of what has been done, and I hope before long to treat the subject more fully in the pages of a special bulletin.

RUDOLPH D. ANSTEAD,
Planting Expert.

Analyses of Coffee Pulp.

1		2	3	4
Fresh Pulp.		Pulp left in pit for seven months.	Pulp to which Lime has been added.	Indian Cattle Manure. Box system.
* Organic matter... (Phosphoric Acid (P_2O_5) Potash (K_2O) Ash. { Lime (CaO) Insoluble matter Other Mineral matter	...	84.76	67.40	56.90
	...	0.81	0.84	0.93
	...	2.38	1.82	3.26
	...	0.57	14.46	.....
	...	0.45	4.59	29.88
	...	11.03	10.89	9.68
* Containing Nitrogen	...	100.00	100.00	100.00
	...	2.61	1.68	2.07
Nitrogen value per ton in terms of White Castor Poonac		975 lbs. Rs. 32-10	.....	.....
Value per ton when Potash and Phosphoric Acid are taken into account...		Rs. 37-10	.....	.....
Moisture in fresh sample		89.50	.....	.....
Tons fresh pulp to give one ton-dry		9.5	.....	.....
Value of one ton fresh Pulp		Rs. 4-3	.....	.....

Analyses of Composts.

					5	6	7	8	9
					Compost South Mysore.	Compost Ananalaus.	Compost Bababudins	Compost from Cat-tile shed.	Indian Cattle Manure Box System.
* (Organic matter Ash { Phosphoric Acid (P_2O_5) Potash (K_2O) Insoluble matter Other Mineral matter	...	...	...	...	30.29	45.13	28.95	36.08	56.90
	...	...	...	...	2.17	1.18	2.79	3.27	0.93
	...	...	...	...	1.49	1.85	1.29	3.66	3.26
	...	...	...	...	55.21	33.12	52.04	56.99	29.88
	...	...	...	...	10.84	18.72	14.93		9.03
					100.00	100.00	100.00	100.00	100.00
* Containing Nitrogen					1.12	1.19	0.77	2.23	2.07
Nitrogen value per ton in terms of White Castor Poonac					417 lbs. Rs. 14	443 lbs. Rs. 14-13	288 lbs. Rs. 9-10	833 lbs. Rs. 28	772 lbs. Rs. 25-13
Value per ton when Potash and Phosphoric Acid are taken into account					Rs. 20	Rs. 21	Rs. 16-6	Rs. 40-9	Rs. 34-7
Moisture in fresh Pulp					3.88	38.57	6.83	59.01	49.67
Tons fresh Compost to give one ton dry...					1.04	1.6	1.07	2.44	1.98
Value of one ton fresh Compost					Rs. 19-3	Rs. 13-2	Rs. 15	Rs. 16.6	Rs. 17-2
Cost of making one ton fresh Compost					Rs. 4	?	Rs. 8-12	Rs. 2-8	?

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

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AUGUST 24, 1912.

[PRICE AS. 8.

THE U. P. A. S. I.

(INCORPORATED.)

Annual Meeting.

SECOND DAY, 13TH AUGUST, 1912.

The Delegates met at the Mayo Hall at 11 A.M. and at once went into Committee on Finance and after considerable discussion the Budget for the coming year, with slight modifications was adopted. In the afternoon the financial discussion was continued, affecting the Planters' Benevolent Fund, when resolutions were passed and confirmed in open meeting.

Bulletin.

Mr. Plowden initiated a short discussion with the view of eliciting the opinion of the Delegates regarding the future publication of these. Their value was recognised by all present and the general opinion was that they should be continued from time to time and that some charge should be made for them.

Experimental Plot.

On this subject coming up Mr. Anstead, Scientific Officer, said :—

“ The Kalisyndikat have made the following proposals :—

(1) “ That the Scientific Assistants of the U.P.A.S.I. may be allowed to carry out in the Districts of Mysore and Coorg manurial experiments with coffee, rubber etc.”

(2) “ That the Kalisyndikat should offer a subsidy of £100 per annum, commencing on the 1st January 1913, for each District, which amount is so far considered as being sufficient to cover the expenses of the experiments and the cost of the necessary manures, etc.”

The Kalisyndikat point out that they are not especially interested in which form phosphatic and nitrogenous manures are applied, but lays stress upon the fact that the same are given together with sulphate or muriate of potash.

In return for this subsidy, the Syndikat expects to receive from time to time reports upon the progress of the experiments and these reports will be considered confidential, and not for publication. The final results are to be submitted to the Syndikat, but will not be published until such publication is agreed to by myself.

I suggested to the Kalisyndikat that coffee planters are fully aware of the fact that Potash, Phosphoric Acid and Nitrogen are necessary in any successful manurial scheme, and that I considered that it was quite unneces-

sary to carry out experiments to demonstate this fact again, and that I thought the experiments should be devised in order to discover

(a) the best form of potash to use in conjunction with available forms of Phosphoric Acid and Nitrogen,

(b) the right quantities of Potash and other manures to apply,

(c) what effect, if any, Potash may have upon the growth and latex yield of Ceará rubber.

The Syndikat have expressed themselves as being in agreement with me on these points.

Should the proposal of the Syndikat be accepted, and I strongly recommend that it should be accepted, I propose, in consultation with my assistants to draw up a schedule of the proposed experiments in each district and submit them to the representative of the Kalisyndikat in India on the one hand and to the District Associations concerned on the other, for their remarks and suggestions. It will also lie with the District Associations and the assistants to arrange where the experiments should be carried out.

I may say that the Districts of Mysore and Coorg have been chosen because they are the only ones at present in which assistants have been appointed, and it is impossible for me to undertake the responsibility of experiments unless there is a special officer in the district to take charge of them and personally supervise them. Should other districts in the future decide to appoint assistants, I have little doubt but that the Kalisyndikat would be willing to give them a similar grant for experiments. The Kalisyndikat propose to pay the grant directly to the U.P.A.S.I. and that it should be controlled by me and used to defray the cost of the experiments and the artificial manures at my discretion. The Syndikat will not pay for nitrogenous manures like *poonacs*, but only for artificials and administration.

I consider that the manurial problem is one of the most important as far as coffee is concerned, and I beg to recommend that the proposals of the Kalisyndikat be accepted with thanks."

The proposal outlined above was finally adopted and accepted by the Coorg and Mysore Delegates with thanks.

THIRD DAY, AUGUST 14TH, 1912.

On reassembling at 11 a.m. the morning was devoted to agricultural subjects. The Hon'ble Mr. Jackson, the Chairman of the Madras Chamber of Commerce and one of the Members of the Indian Tea Cess Committee, who was a visitor, kindly addressed the Delegates on the subject of the Indian Tea Cess and gave much interesting information and figures that clearly showed the advisability of continuing the compulsory cess during good years.

Fertilisers.

Mr. Anstead, the Scientific Officer, than delivered an interesting lecture which was received with great attention by every delegate. This important lecture was published in these pages last week.

THE EXPORT OF BONES.

Mr Barber, in introducing this subject, said that in a matter of this kind on which they were in agreement, there was a great danger that such an important subject did not receive proper discussion. All were so pleased to find something that they could agree about that a resolution was drawn

up, passed unanimously, and the subject was forgotten for another year. This year the resolution that he was going to put before the Meeting was to bring to the notice of Government that the export of manures indigenous to the country was being carried out for the benefit of individuals. A lot of suggestions had been made with regard to this, such as that it was impoverishing the country and eating up the seed corn. It was also suggested that an export duty on bones would be an interference with vested interests. He did not think that in a matter of such importance to agriculture such a suggestion should be entertained economically, or considered by Government. It had also been suggested that an export duty on bones would lower the prices to the detriment of producers, but that perhaps this might be met by fixing a minimum price. He did not think that this was theoretically correct, because in a country like this, it was necessary that things like this should be as cheap as possible to the inhabitants, whatever the price might be to foreign purchasers. Mr. Mahon had given him some instructive figures regarding the export of bones and other manures, which showed that the bones exported in 1910-11 amounted to 8,181 tons, valued at Rs.4,26,994,; fish manure to 14,061 tons, valued at Rs.6,30,745, poonac to 23,690 tons, valued at Rs.15,06,866. On looking at the statement where these manures went to it would be found that the bulk of them went to Ceylon. He did not think he need say anything more, but he would like the matter discussed and resolution he had suggested passed.

The subject was exhaustively discussed in Committee, when Mr. Graham moved the following amendment:—"Tha this Meeting is of opinion that a small Committee be appointed to go into the matter of the export of indigenous manures and submit a report before the next Meeting."

The following Committee, with power to add to its numbers was appointed:—Mr. Barber, Mr. Mahon and Mr. Anstead.

FOURTH DAY, AUGUST 15TH, 1912.

For the last day's session, the Delegates met at 12 O'clock and sat continuously until the business of this year's meeting was finished. Various matters of interest were discussed such as registering by Finger Pouts for which a Sub-Committee was named to receive the opinion of the various associations and non-service of warrants. Then the Meeting proceeded to elect the office-bearers for the ensuing year with the following result.

Chairman	...	...	Mr. C. E. Abbott.
Vice-Chairman	...	...	Mr. Mahon.
Vice-Chairman	...	...	Mr. Hughes.

Mr. E. F. Barber was nominated as Planting Member of Council at the election to be held in November. The elected gentlemen briefly acknowledged the compliments.

Mr. Mahon then proposed a vote of thanks to the Chairman for his services during the past year. He had had many difficult problems to face but they had been faced with courage, tact and sound judgment, and he was sure the Delegates owed him a hearty meed of thanks.

The Chairman in reply said:—"I am very much obliged to you for your great kindness in re-electing me for the second year running, and for the third time your Chairman. It is an unusual honour, and I think that in a general way it is not desirable that a man should hold office in this way for

two years in succession. But in the very special circumstances of this year I feel that it is intended as a vote of confidence in me. I am very much obliged and accept it as such. I need not say that I shall do my best to carry out whatever work comes my way. We have got through a fairly long agenda paper in good time, and, though as I said before, this has been a year of quiet progress and no very controversial points have arisen which accounts for a good deal of this, it by no means accounts for all of it, and I have to thank you all for your cordial support of the Chair through the Meeting.

It is gratifying to myself and the Finance Committee that so many associations have agreed to pay the increased subscriptions and that all are now subscribers to the Scientific Officer Fund. I have been Secretary of my own Association for some years. And I know that it is often difficult to get members to agree as to the amount of support that ought to be given to the Central Association. We are now collecting a larger income than ever before. Our finances are on a sound basis again, and while it may be thought desirable that all associations ought to pay on the same basis, it must be remembered that the resolution passed last year asked the subscription from those who could afford to pay it and what we want to make sure of now is that there are no withdrawals. It may take a little time for all associations to come into line, and I am very strongly of opinion that the matter ought not to be forced in any way. I have to thank you again, Mr. Anstead, for all the assistance you have given me before and during the Meeting, and you Mr. Bremner for giving us the benefit of your long experience at these Meetings, when doubtful points of procedure arose. I would also like to convey the thanks of the Association to Mr. Krumbiegel for his kindness in sending plants to decorate our Exhibition. And lastly, Gentlemen, I thank you for the great friendliness and forbearance you all have shown me throughout. I now declare this Meeting closed."

Memo of Resolutions.

WEIGHTS AND MEASURES.

1. "That this Association approaches the Governments of India (through the Government of Madras), Mysore, Travancore, and Cochin and begs that further steps be taken towards the general standardization of all weights and measures in India."

"Also that all Chambers of Commerce in India be written to and asked to support the resolution."—Carried.

ROADS AND COMMUNICATIONS.

2. "That the Government once more be approached, through the auspices of the U.P.A.S.I., towards the opening up and development of the Province of Coorg by means of railway connection with the outer world."—Carried.

RAILWAYS.

3. "That this Association endorses the opinion of the Chamber of Commerce of Karachi and considers that the action of the Secretary of State is entirely contrary to the best interests of India and that the money at present invested at ridiculously small interest at Home could be much better utilised for the construction of light railways and communication roads which are urgently needed in the interests of the community generally and suggests that in the event of Government being unable to immediately finance the proposed schemes it withdraw all opposition to private enterprise."—Carried.

AHTOOR GHAT ROAD.

4. "That the District Board of Madura be asked to hand over the Ahtoor Ghat Road to the estates on the Pulneys, that are interested in its repairs and upkeep, and to allot Rs.1,000 (minimum) per annum towards its maintenance, provided that the estates concerned guarantee to spend at least Rs.700 per annum over and above that sum for the next 5 years."

"Also that the Board be asked, should the estates' contributions exceed Rs.700, that the District Board allotment may be increased proportionately. And further that the District Board be informed, should the above proposals meet with the District Board's approval, that the contributing estates are prepared to supervise the work on the road and to submit such accounts as may be deemed necessary by the Board."—Carried.

TELEGRAPHS.

5. "That this Association do approach the Government with a view to getting the cost of constructing public telegraph lines to planting districts reduced."—Carried.

CATTLE TRESPASS.

6. That the Government of Madras be asked to take steps to prevent the straying of cattle along public roads.—Carried.

TEA CESS.

7. "That this Association is in favour of the renewal of the Tea Cess for 5 years"—Carried.

THE S. I. P. B. FUND.

8. "That the Mercantile Bank of India, Madras, be asked to take charge of the investments and funds of the S. I. P. B. Fund and that cheques drawn upon the fund require the signatures of the Chairman for the year and the Secretary, U. P. A. S. I."—Carried.

THE "PLANTERS' CHRONICLE."

9. "That the *Planters' Chronicle* be continued as a weekly paper that the contracts made by Mr. Ormerod be fulfilled, that the Secretary, U. P. A. S. I., be appointed Editor and Manager and given half the profits as remuneration and that the accounts be kept entirely separate."—Carried.

ENGAGEMENT OF MR. FRATTINI.

10. "That this meeting confirms the engagement of Mr. G. N. Frattini as Scientific Assistant for Mysore."—Carried.

BULLETINS.

11. "That this meeting is of opinion that bulletins published on the same lines as the Peradeniya Pamphlets, dealing with Rubber, Coffee, Tea and other crops grown in South India would be of considerable interest to individual planters, should be published in conjunction with the *Planters' Chronicle* and that a charge of 3/ per annum should be made to include a copy of all bulletins issued during the year to all subscribers and that any surplus derived from subscriptions should be transferred to the General Fund of the U. P. A. S. I."—Carried.

EXPERIMENTAL PLOT.

12. "That the Kalisyadikat offer be accepted with thanks."—Carried.

SCIENTIFIC DEPARTMENT.

13. "That the Scientific Department be asked to try and see their way to periodically verify the guaranteed analyses of manures sold by different

Manure Firms. It has been suggested that if the Scientific Officer has too much to do to undertake these analyses that perhaps the assistance from Mysore and Coorg might be spared for a month in the year to undertake these analyses."—Carried.

COFFEE FERTILIZERS.

14. "That the U. P. A. S. I. be asked to bear the subject of bees and fertilization in mind and that the Secretary be empowered to remind the Government of Madras to allow their entomologist to investigate the matter some time before the coffee blossoms next year and offer them all the assistance in their power."—Carried.

ADULTERATION OF COFFEE.

15. "That the Government be approached through the U. P. A. S. I. with a view of dealers in this country being restrained from selling coffee in tins, with a large percentage of cheap admixtures, under the name of 'Pure Coffee' without adding the percentage of adulterant."—Carried.

EXPERIMENTS.

16. "That as this Meeting considers the compost experiments that Mr. Anstead has done are of extreme value, he be requested to carry out further experiments on the same lines."—Carried.

ARTIFICIAL MANURES.

17. "That this Association do write to the firms supplying the commonly used fertilisers, to explain the difference in cost per lb. of Nitrogen, Phosphoric acid and Potash, as supplied by them."—Carried.

INDIGENOUS MANURES.

18. "That a small Committee, Mr. Barber, Mr. Mahon, and Mr. Anstead, with power to add to their number, be appointed to go into the matter of the export of indigenous manures before the next meeting."—Carried.

TOBACCO.

19. "That this Association do approach the Government of Madras with a view to tobacco being allowed to be imported by post into Travancore and Cochin; also approach the Trades' Association of Madras and obtain their support."—Carried.

EMIGRATION.

20. "That the Government of India through the Government of Madras be approached with a view to getting an explanation of the position they are taking up as regards the emigration of labour for Governments outside of India particularly as regards the labour going to the Federated Malay States and Zanzibar."—Carried.

LABOUR.

21. "That a scheme of registration read at this meeting be printed and circulated among District Planters' Associations in order that the subject may be considered thoroughly with a view to coming to some definite conclusion at the next U. P. A. meeting."—Carried.

22. "That a Sub-Committee be formed consisting of Messrs. Brock, Hughes, Abbott, Mahon and C. H. Brown—with power to add to their number—to receive the opinions of the various Associations and to harmonize them if necessary and to circulate a *working scheme* to the District Associations before the next Annual General Meeting with the idea of improving the labour position."—Carried.

23. "That the names of all known recruiters for places outside India be printed in the *Planters' Chronicle*."—Carried.

NON-SERVICE OF WARRANTS.

24. "That the following suggestions be communicated to the D. I. G., Southern Circle, with the hope that he will give orders to all Superintendents of Police to give effect to these suggestions :—

1. That any Magistrate issuing the warrant to a Maistry should notify the District Superintendent of Police of the district concerned that such a warrant has been issued.

2. That all 'hand' warrants should also be endorsed by the District Superintendent of Police of the district in which the warrant is to be served or by his Office Manager.

3. That, on enquiry of a Planter as to the status of any particular maistry, the Superintendent of Police for the district in which the maistry lives shall make enquiries as to the maistry's standing and means, and report the same to the Planter."—Carried.

FINANCE.

25. 1. "That the Finance Committee consist of not more than 5 members namely Chairman, Vice-Chairman and Planting Member and the Chairman (or a Vice-Chairman) of the previous year. That the Secretary be Secretary to the Finance Committee.

2. That it is understood that the Finance Committee have direct executive control of all matters concerning finance or connected therewith."—Carried.

SECRETARYSHIP.

26. "That the meeting confirm the appointment of Mr. Norton as Secretary subject to three months' notice on either side and that the Chairman has power to give that notice should he deem fit to do so, Mr. Norton having the right of appeal to the Councillors, if necessary."—Carried.

AUDITORSHIP.

27. "That a further fee of Rs. 50 be paid to Mr. Haldwell as a special remuneration for the extra work entailed in introducing a new system of accounts."—Carried.

VOTING.

28. "That in future all voting shall be on combined subscriptions from each district at the rate of one vote for each Rs.10 subscribed, provided that such a subscription from any district shall not exceed the rate of 2 as. per acre."—Carried.

The U. P. A. S. I. Exhibition.

AN UNVEILING CEREMONY.

At the Exhibition held last year three portraits, the beginning of the U. P. A. S. I. picture gallery, were unveiled. During the year a handsome portrait of Mr. G. L. Acworth was presented to the Association and at the opening of this year's Exhibition on Thursday morning, 13th August, it was duly unveiled.

The Chairman, Mr. C. E. Abbott, first addressed those assembled as follows:—

“ Mr. Acworth, who was Chairman in 1896 and Member of Council from 1900 to 1903 was a very good fellow and a born enthusiast who worked away at a measure until he succeeded. His work for the “ United Planters' Association ” was an example to those men of influence in their district who make the mistake of not coming to the Conference and expressing their views. Mr. Abbott did not wish to rake up the embers of a dead fire, but he could not help remarking that the energies of the association had for years now been devoted to the labour problem in all its stages, for which Mr. Acworth had done his very best, but they had been up against a stone wall ever since. Much had been promised to them in regard to railways, but those promises had been dropped. When they offered to pay for their schemes their proposals had been pooh-poohed. When they asked questions they were told in effect that the authorities did not want to hear any more of their proposals on the subject of emigrations, also they could obtain no satisfaction. They had been seeking redress for the present situation for nine years, and had even instanced cases of cruelty to coolies without exciting reasonable interest. Their Coffee Cess proposal had also been pooh-poohed. The speaker could go on multiplying instances of such indifference, but perhaps it was better for them, after all, to have been left out in the cold so long. When they were taken back in favour perhaps their experience would be a lesson to them. He hoped, in conclusion that Mr. Acworth in his retirement would read in the *Planters' Chronicle* that they had at any rate done what honour they could to his memory.”

Mrs. Abbott then unveiled the portrait amidst applause.

This year's display of exhibits was not so numerous as that of last year, but a very creditable show was made. The exhibits had been carefully arranged by Mr. G. N. Frattini, the Scientific Assistant for Mysore aided by a Committee consisting of Mrs. Abbott and Mr. W. H. Reed, and thanks to the kindness of Mr. G. H. Krumbeigel who lent foliage plants from the Lal-Bagh Gardens the room was a bower of ferns and palms.

It is not possible in these pages to give a full list of the exhibits, but a few comments may be made on the various groups.

RUBBER.

The samples of rubber showed considerable advance, both in appearance and quality, to those of last year and very strikingly marked a year's progress. The exhibit from the Cochin Rubber Co., was the centre of attraction and the sponge-like masses of worm-rubber elicited much admiration. A nicely arranged exhibit from Eldorado Estate, Mundakayam, showing a number of different grades of crépe was also much admired by the rubber experts, while Mr. L. E. T. Short's samples of Ceará Rubber coagulated with water without any acid showed what an advance had been made with this at one time despised and neglected source of rubber.

TEA.

An excellent display of Tea was shown this year from the Nilgiris and Travancore, and samples of various grades of Green Tea prepared for the Canadian and Russian Markets by Messrs. Harrison and Crossfield Ltd. were of great interest. The Pekoes and Orange Pekoes from Travancore exhibited in big packets also came in for much admiration. These Tea samples are going on to the Mysore Dasara Exhibition where they will probably carry off prizes.

COFFEE.

Only a small display of Coffee was made this year. The Hon'ble Mr. J. G. Hamilton exhibited some clean coffee of various grades, and Messrs. Brock and Bailey some tinned and roasted coffee.

MISCELLANEOUS.

Messrs. Parry & Co. exhibited a fine collection of samples of the various fertilisers supplied by the Presidency Manure Works Ltd., and the Scientific Department of the U.P.A. a few samples of special fertilisers, with their analyses, which had been examined during the year and discussed at the Meeting.

Messrs. Petrie Hay & Son most kindly exhibited some Coffee Machinery in the hall. This is quite a new feature of these annual exhibitions and a most interesting one and the thanks of all coffee planters present at the Exhibition are due to Mr. Hay, who was personally in charge of the Machinery, for all the trouble he took in the matter.

Mr. Kirwin exhibited some crude Camphor and the Scientific Officer gave a demonstration in his Laboratory during the course of the Exhibition of the way in which this could be refined and purified by a process of sublimation.

Taken as a whole the Exhibition may be considered to have been a very successful one and it certainly added interest to the Meeting. Warm thanks are due to the Exhibition Committee for all the trouble they took in the matter.

VISIT TO THE INDIAN INSTITUTE OF SCIENCE.

On the afternoon of Friday, 16th August, many of the Delegates accepted the invitation of the Officiating Director and Officers of the Indian Institute of Science to visit the Institute. A most enjoyable and instructive afternoon was spent in going round the various laboratories where work was in progress.

The Officers of the Institute personally conducted parties round the different Departments and it was difficult to say which was the most interesting; the Electrical Department with all its wonderful machinery obeying the will of Dr. Hays and apparently literally 'under his thumb,' since it moved when he pressed a button; the Chemical and Physical Research laboratories where Mr. Watson took infinite trouble to explain beautiful apparatus; or the Department of applied Science when Prof. Rudolf showed us things in the making.

Mr. Watson gave us all a great treat by showing us liquid air, not an unconvincing sample in a bottle which many of us have seen before in a museum, but pints of this wonderful liquid which could be poured from vessel to vessel, and though looking like water, froze everything put into it solid in a few seconds, even mercury.

Prof. Rudolf also delighted the more practical minded of us by showing us the machines at work, and the processes of soap making, wood distilling, and many other wonderful things actually going on on a large scale.

At the Institute everything is done perfectly, and this includes the entertainment of their guests. To the ladies who so kindly received us, and to Prof. Rudolf and all the Officers of the Institute cordial thanks are due for an extremely pleasant and instructive afternoon.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Minutes of the Half-yearly Meeting of the above Association held at Twyford Bungalow, Saturday, 27th July, 1912 at 10 a.m.

PRESENT.—Messrs. F. Bissett (Chairman), T. C. Forbes (Vice-Chairman), W. A. J. Milner, F. W. Winterbotham, H. C. Westaway, J. A. Richardson, J. H. Ellis, F. E. Thomas, R. Mackenzie, S. C. H. Robinson (Honorary Member), R. D. S. Hodgins, W. E. Forbes, (Visitor) and R. P. Roissier (Honorary Secretary).

The minutes calling the meeting were read.

The Proceedings of last meeting were confirmed and taken as read.

Correspondence.—Read letter from the Chief Secretary to Government No. 4279 of 13th July, 1912 *re* Tolls. Read letter from the British Resident No. 268 of 25th June, 1912 *re* Tobacco Duty. Read letter from the Superintendent, Devicolum Division, No. 2 of 11/1067 of 3/4 June, 1912. Read letter from the Superintendent, Arnakal Grant-in-aid Dispensary of 15th July 1912, also letter from the Superintendent, Bonami Grant-in-Aid Dispensary of 15th July, 1912 *re* Grants. And the Honorary Secretary was instructed to write to the Superintendent of the Arnakal Dispensary asking the reasons why no Apothecary had been appointed to that Dispensary. Read letter from Honorary Secretary, South Travancore Planters' Association, dated 3rd July, 1912 and it was proposed by Mr. Forbes: "That this Association is quite agreed on the necessity and the benefits received by being members of the U. P. A. S. I. The Association, however, acknowledges that it would be of distinct use for Delegates of Travancore and Cochin Associations to meet annually to discuss local matter." Seconded by Mr. Westaway and carried unanimously. Read letter from Mr. M. M. Varugisa of 11th June, 1912 *re* Stolen Tea and it was proposed by Mr. Richardson and seconded by Mr. Thomas and carried unanimously: "That the Honorary Secretary be instructed to write the Superintendent of Police asking him for any suggestions as to the ways and means of preventing theft of Tea which is becoming a very serious matter in the District." Read letter from the Honorary Secretary, Kanan Devan Planters' Association of 12th June 1912. Read letter from Honorary Secretary, South Travancore Planters' Association of 1st July 1912. Read letter from the Chief Secretary to Government No. 6688 of 4th July 1912. Read letters from Secretary U. P. A. S. I. of 1st June, 20th June, 1st July also circular letters of 1st July No. 23/12, 17th July No. 26/12, 17th July No. 27/12, 17th July No. 25/12, 22nd July No. 31/12. It was decided that instruction would be given to the Delegate later and as regards exhibits of Tea for U.P.A.S.I. meeting the Superintendents of the following Estates promised to send in exhibits: Stagbrook, Ashley, Glenmary, Kuduakarnam and Ladrum. Read letter from Mr. C. E. Abbott to U. P. A. S. I. of 15th July 1912. Read letters from Mr. McArthur, Manager in India Travancore Tea Estates Coy., Ltd., of 12th June 1912, 27th June 1912, 1st July 1912, and 5th July 1912 *re* the withdrawal of this Company from the Association. Mr. Forbes then proposed the following Resolution: "That this Association very much regret the position taken up by Mr. McArthur, Manager in India of the Travancore Tea Estates Coy., Ltd., with regard to his resignation and to his refusal to pay his full year's subscription to the Association for 1912; and that this Association considers that the action taken by them is in order and that the interpreta-

tion of Rule 16 as taken by Mr. McArthur is wrong." Seconded by Mr. Ellis and carried unanimously. The Honorary Secretary was instructed to send a copy of this resolution to Mr. McArthur.

Election of Bangalore Delegate.—It was proposed by Mr. Bissett and seconded by Mr. Richardson: "That Mr. Westaway be asked to represent this Association at the forthcoming meeting of the U. P. A. S. I," and this Mr. Westaway kindly consented to do.

Motor Transport.—This important scheme was discussed at length and Mr. Ellis proposed "that a Committee consisting of Messrs. J. A. Richardson, R. Mackenzie, T. C. Forbes, and F. E. Thomas be formed to go thoroughly into the matter." Seconded by Mr. Westaway and carried unanimously.

Labour Rates.—The list of rates as sent in by members of the Association was then read and the rates discussed. Mr. Richardson proposed: "That a Committee consisting of Messrs. T. C. Forbes, F. Bissett, and R. P. Roissier be formed to go thoroughly into the matter of these rates and that the Committee have power to add to their number." Seconded by Mr. Ellis and carried unanimously.

Roads.—Read letter from the Sub-Division Officer No. 193 *re* Church Hill Road also letter from the Superintendent, Stagbrook Estate, on the same subject and it was resolved: "That the Honorary Secretary do write to the Chief Engineer and Executive Engineer on the subject."

Mannans Creek Bridge.—Letters were read from the Superintendent, Arnakal Estate, of 20th June and from Mr. McArthur, Manager in India, Travancore Tea Estates Coy., Ltd., of 17th June *re* the Bridge. Resolution by Mr. J. H. Ellis: "That the Chief Engineer be written to requesting him to send a responsible Engineer at an early date to inspect the Kuduakarnam—Ladrum Road and give his advice since the recommendations made by the Overseers who went over the road last year does not meet with our approval." Seconded by Mr. Winterbotham and carried unanimously.

With a vote of thanks to the Chair the meeting terminated.

(Signed) REGINALD P. ROISSIER,
Honorary Secretary.

South Travancore Planters' Association.

Proceedings of the Second Quarterly Meeting held in the Club, Quilon, on Saturday, August 3rd, 1912.

PRESENT—Mr. J. Stewart (in the chair), Messrs. C. Brander, S. A. Martin, W. H. Chalmers, J. B. Cook, S. W. Sinclair, R. Lamb, H. S. K. Morrell, L. G. Knight, T. L. Jackson, W. Cree, H. W. Heberden, A. H. L. White, Millbank and A. W. Leslie (Honorary Secretary). *By Proxy.*—Messrs. J. S. Valentine, E. C. Sherman, J. H. Parkinson, and R. Branson. *Visitors.*—Messrs. J. Mackie, A. F. Macdonald, and F. Mackay.

The Minutes of the last meeting were read and confirmed.

The U. P. A. S. I.—After a brief discussion, it was resolved to leave over for future meetings, the proposal re-seceding from the U. P. A. S. I.

Annual Meeting at Bangalore.—It was agreed that no delegate be sent to represent the Association at the annual meeting this year.

Roads and Bridges.—It was proposed by the Chairman and seconded by Mr. Sinclair: "That as a number of cart roads have been cut by different estates, and are now being used by Government, a list of these roads be sent in to the Honorary Secretary from the different estates, and that he be requested to write Government asking them to pay their share of the cost and maintenance."—Carried.

Importation of Tobacco into Travancore.—Read letter from Mr. J. A. Richardson, and resolved: "That his appeal receive the support of all Europeans in the state."

Mr. Knight's Resolution.—That the Honorary Secretary of this Association be asked to circulate all important letters was seconded by Mr. Cook and carried.

Associations' Banking Account.—Proposed by the Chairman: "That this be continued in the hands of Messrs. Harrison and Crosfield, Ltd., Quilon." Seconded by Mr. Sinclair and carried.

Conveyance of Mail Letters.—It was proposed by Mr. Heberden and seconded by Mr. Morrell: "That the Honorary Secretary be asked to write and complain to the Post Master General that letters from the districts are only carried to Quilon by the train reaching there at 5 o'clock in the evening and to suggest that a mail bag may be made up for the night train also, as great delay is caused by the present arrangements and further that all correspondence with the Post Master General regarding the delay in mails be in future sent through the Honorary Secretary."—Carried.

Arms Regulations.—Proposed by Mr. Cook and seconded by Mr. Knight: "That the Honorary Secretary write to the Travancore Government, *re* the Arms Rules of 29-1-1912 and to ascertain whether the rule by which an annual license could be obtained to carry arms with sufficient ammunition through all Frontier Chowkeys is superseded, and further what is meant by their bye-law. No. V of 1084 29-1-1912 *re* transporting arms from one part of this state to another."—Carried.

Planters' Benevolent Fund.—The subscription list for 1912 was passed round the room and received good support.

Correspondence.—Read letter from Conservator of Forests *re* capture of elephants. Read letter from U. P. A. S. I. *re* the Benevolent Fund accounts.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) A. W. LESLIE,
Honorary Secretary.

H. M. Minister at Bogota says *The Board of Trade Journal* reports that the prospects for this season's coffee crop in Colombia are favourable, and the yield is expected to be considerably larger than it was last year. It was at one time hoped that there would be a record crop, but the exceptional drought which has prevailed since November has caused much damage in most parts of the country and destroyed these hopes.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Contents of present Issue.

At the Annual Meeting a desire was expressed that a special section of the *Chronicle* should be devoted each week to a short record of the work in progress in the Scientific Department, including the movements, &c., of the Scientific Assistants. With this issue, therefore, such a section is begun. It will usually be written by the Scientific Officer and will contain field notes of general interest received from the Scientific Assistants, analyses made in the laboratory, etc., and will in fact largely, if not entirely, replace the Scientific Officer's Notes and Comments.

The Scientific Officer's Paper this week deals with species of *Sesbania*, leguminous weeds suitable for green dressings. This paper is the first of a series which will be continued from time to time as material comes to hand.

A Ceylon Circular, (No. 17 of Vol. V) contained interesting notes and figures relating to a number of leguminous plants used as green dressings in Ceylon and it is hoped to gradually write up the Indian plants in a similar way.

In the Rubber section will be found a digest of the Annual Report recently issued by Mr. Lewton Brain, the Director of Agriculture in the Federated Malay States, which contains much that is of interest to Rubber planters in South India.

A Circular published by some well-known Rubber Brokers, containing a proposed system of manufacture to produce standard grades of Rubber on the estates is also re-produced from the columns of *The India Rubber Journal*. If the grades of plantation rubber were standardised, it should popularise it on the London market.

The Proceedings of Annual Meeting of the North Mysore Planters' Association appears in this issue. These Proceedings were received some weeks ago, but have been crowded out by the report of the Annual Meeting of the U. P. A. S. I. which completely filled the last two issues.

Names of Recruiters.

The Messrs. Goodfellow placed with the Secretary the names and addresses of the following recruiters with a promise that additions to their list would be furnished to the Secretary, U. P. A. S. I., for publication :—

W. A. A. Lawrence, Mysore.

Appooswamy, Trichinopoly.

Sivalingam, Salem.

R. C. D'Santos, Dindigul.

A. E. Wilson, Jalarpet.

A. Sundrum Iyer, Rajah Street, Coimbatore.

R. Stafford, Chief Station Master, Cuddalore.

Venkataramiyyer, Salem Zemindari.

Scientific Officer's Papers.

CVII.—STUDIES OF LEGUMINOUS GREEN DRESSING PLANTS.

I.—SESBANIAS.

There are three species of *Sesbania* which have been used as green dressings, *S. aegyptiaca*, *S. aculeata*, and *S. cannabina*. The first two of these are common plants in South India while the latter, which is really a variety of *S. aculeata*, is the 'Daincha,' of the Assam Tea Estates.

S. aegyptiaca, is a soft wooded perennial, but short lived, shrub which reaches with a straggling growth a height of six to ten feet. It bears numerous slender branches, and delicate fern-like leaves three to six inches long with twenty-one to twenty-four small, smooth, pale green leaflets on each. The small, yellow, pea-shaped flowers are borne freely in loose racemes springing from the axils of the leaves, and these flowers are sometimes more or less tinged with deep red. The pods are six to nine inches long.

The plant is usually to be found in swamps and wet places such as the sides of paddy fields. One of its local names is 'Agase,' while another is 'Angi Kashi gidda' given to it, I am told, on account of the appearance of the pods which look like the pieces of string (kashi) with which the natives used to tie their jackets (angi) before buttons were introduced. Another Canarese name for the plant appears to be 'Arasina jinangi mara.'

S. aculeata is a very similar plant, but an annual and a smaller plant. It has a straggling branched habit and grows several feet in height, and the branches and leaf stalks are covered with weak thorns or prickles. This serves to distinguish it sharply from *S. aegyptiaca*.

The leaves are from six inches to a foot long with numerous, (41 to 81) leaflets smaller and narrower than those of *S. aegyptiaca*. The flowers are small and yellow, the standard being dotted with red. The pods are six to nine inches long. One of the Canarese names of this plant is 'Mullu Jinangi gida (thorny) and another is 'Agase.'

S. cannabina is almost a variety of *S. aculeata*, with smaller and fewer flowers. This is the 'Daincha' of North India, where it is used extensively as a green dressing for tea.

Another member of the genus is a well-known plant, namely *S. grandiflora*, the 'Agate' of the Tamil, a small short-lived, soft-wooded, tree reaching a height of 20 to 30 feet, with large pea-shaped, white or pink flowers, two to four inches long, followed by pods a foot or more long. This is the tree which is commonly grown as a support for the Betel Vine.

Sesbanias of several kinds have been used for green dressings with good results in many tropical countries. In Rhodesia in 1909 *S. punctata* was found to possess valuable fertilising properties when used as a green dressing for Lucerne and Oats. In Bengal in 1910 it was reported in the *Quarterly Journal* that *S. aculeata* had proved a good green dressing for tea. The ground was prepared for the seed by hoeing and the seed was sown broadcast among the tea. In five weeks time the Sesbania was a foot high and at this stage it was hoed into the soil, and a new crop sown down. When used as a green dressing for Tobacco in Bengal the result was to increase the crop by about fifty per cent. and similar success has been obtained with Rice.

Thus in the *Scientific Report of the Palur Agricultural Station* for 1911-12 it is stated that "an experiment was made to estimate the residual value left in the land from a green manuring crop of daincha (*Sesbania aculeata*) in the previous year. For this purpose a plot was chosen where heavy crops of daincha had been puddled in for the last two years and single crops of garudan samba paddy grown. This land was this year double cropped and no manure was applied. The yields of paddy in pounds per acre for the last five years are as follows :—

					Lbs.
1907—Sugarcane, an exhausting crop.					
1908—Garudan samba manured with 500 lbs. ground nut cake					
per acre	...	...	...	...	1,388
1909—Garudan samba green manured with daincha and 250 lbs.					
ground nut cake per acre	...	...	...	...	2,544
1910—Garudan samba green manured with daincha. No cake					
applied	...	...	...	...	2,944
1911—No manure	{	1st crop Sornawari	...	...	2,520
		2nd crop Garudan samba	...	...	1,600

"The residue of the 1910 daincha crop was probably all consumed this year by the first crop of paddy. To keep up the double crop land therefore it seems advisable to supplement the residue of the green manuring crop with an artificial fertiliser after the first crop has been harvested. It also seems that the supplementing of the green manuring crops with artificial fertilisers on single crop lands would be remunerative."

In the Nilgiri-Wynaad experiments have been tried with both *S. aculeata* and *S. aegyptiaca* in Tea. The seed is sown just before the monsoon and allowed to grow for three or four months when it reaches a height of three or four feet. It is then cut down and used as a mulch or dug into the soil. A leading tea planter in this district who has made a trial of *Sesbania aegyptiaca* writes me as follows on the subject :—

"I collected the seed before I went home and left it to be planted during my absence. Some of it was sown in the Tea round my bungalow and some in the cleaned swamp in my 1907 clearing. The former came on, I am told, very unsatisfactorily and it was grass knifed down before it had grown more than a few inches high. Although this field was kept clean weeded and dug last year the *Sesbania* is coming up all over it now. I have tried to keep the other weeds out and give it a chance. It is the originally sown seed evidently coming up now (sown in May 1909). That grown in the swamp grew to over six feet in height and many of the stems were four to six inches in circumference. It was an absolute jungle. I cut it down and dug it in. It seeded itself and is coming up well again now. It is impossible for me to form any opinion of its effect on the tea in the swamp as the tea plants are more or less a minus quantity. I collected a lot of seed this season and have sown it in the Tea again. I may be able to form an opinion next season. There is little doubt that under favourable circumstances it seems to grow well in dry land, but it appears not to germinate quickly in such land."

Sesbania aegyptiaca would appear to be an excellent green dressing for Rubber and is preferable, other things being equal, to *Sesbania aculeata* owing to the absence of thorns. I have recently had an opportunity of analysing a sample of this plant from a Hevea Rubber clearing in North Mysore. The Scientific Assistant for Mysore in forwarding this

sample reported that the plants at the time they were beginning to flower had reached a height of five feet eight inches and the roots penetrated to a depth of two feet six inches and were covered with nodules. *Sesbania* roots are usually very prolific of nodules.

Of the analyses below, that of *S. aculeata* has been calculated to dry weight from figures published in the *Progress Report*, No. XLV, of the Ceylon Agricultural Society obtained from a sample of the crop as cut, while that of *S. aegyptiaca* was made in my laboratory on the sample from North Mysore referred to above, and is the analysis of the whole plant, leaves, stems, and roots.

				S. aculeata.	S. aegyptiaca.
*	Organic matter	...	...	92.8	88.81
Ash.	Phosphoric Acid	...	...	0.5	0.89
	Potash	...	...	1.1	3.05
	Lime	...	...	...	1.13
	Silica	...	...	5.6	2.55
	Other mineral matter (by difference)	...	...	...	3.57
				100.0	100.0
*	Containing Nitrogen	...	...	2.8	2.41

The dry material of the leaves, stems, and roots of *S. aegyptiaca* contained 4.78%, 1.21% and 2.8% of Nitrogen respectively.

RUDOLPH D. ANSTEAD,
Planting Expert.

COFFEE AND TEA IN SIAM.

Coffee growing in Siam, which has been an experiment by missionaries in Chantabon Provinces for some years, has according to a consular report, now been taken up by the general population, and coffee planting is being rapidly extended. At present the yield is only 10,000 to 20,000 pounds a year, all of which finds a market in Bangkok, where the taste of this coffee is finding favour with many Europeans.

Instead of being used for a beverage, the leaves of the tea plant, after being fermented, are rolled into balls, one of which is placed in the hollow of the cheek and allowed to remain there until the soluble contents have been exhausted by the saliva. This use of tea is common in northern Siam. The tea plant is cultivated to only a small extent, but is found wild on hill slopes. In lower Siam, tea drinking is indulged in to a considerable extent, especially among the Chinese.

The tea imports into Siam in the fiscal year 1910-11 amounted to 10,665 piculs (1,422,000 pounds), valued at \$291,915, nearly all of which came from China and Hongkong.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Mr. G. N. Frattini, Scientific Assistant for Mysore, left Bangalore for Birur on the morning of 26th August. He will be occupied for a few days in inspecting some Limestone deposits in the neighbourhood of Birur in connection with the investigation of this question which is being carried out by the Scientific Department, and after that he proceeds on a tour in South Mysore.

While in Bangalore Mr. Frattini took charge of the Exhibition in connection with the Annual Meeting of the U. P. A. S. I., and since the closing of the Meeting and Exhibition, has been engaged in discussing the tour he is about to undertake with the Scientific Officer, and upon laboratory work.

It has been said over and over again that the Coffee soils of Mysore are deficient in Lime content, that is to say contain less than one per cent. of calcium oxide, or 1.78% of calcium carbonate. During the course of the Annual Meeting a special Meeting was held at the Scientific Officer's Office to discuss the work which is being done on the Limestone deposits in Mysore and kindred problems, and it was suggested that certain soils in the Bababudins contained the requisite amount of Lime. Mr. G. R. Oliver kindly supplied a sample of soil from Santaveri Estate and Mr. Frattini carefully determined its Lime content. This proves to be 0.56% of calcium carbonate, so that this soil also is deficient in Lime content.

As stated in the Scientific Officer's Annual Report, the Limestone deposits in Mysore are being systematically examined, and it is hoped to be able to publish a report and certain recommendations before long.

Cassia occidentalis, a common weed, has not been recommended as a green dressing as a rule, and it has not been considered very suitable on account of the small number of nodules usually to be found on its roots.

An experiment which has been recently conducted with it in North Mysore has, however, given excellent results, and one feels inclined to argue that if such a poor legume gives such good results a really good one like *Crotalaria* or *Tephrosia* would give better results than planters have any conception of. The experiment in question is reported upon by the Scientific Assistant for Mysore as follows:—

"Fifteen acres of old coffee were cut down in 1910, the shade was cut out and the land round the coffee stumps was dug. Young shade was planted and in April 1911, *Cassia occidentalis* was sown. By August of the same year the green dressing had grown to such a height as to completely smother the coffee. It was then cut down and forked in. An enormous improvement in the coffee was noticed and it made wood rapidly. Last year the field gave a crop of four hundredweights an acre, a remarkable yield considering that two years previously it had been cut down within six inches of the ground.

An examination of *Sesbania aegyptiaca*, a leguminous plant very common in swamps and the neighbourhood of paddy fields in Mysore and Coorg and elsewhere has been experimented with as a green dressing for Tea in the Nilgiris and Wynaad and for Rubber in Mysore. An analysis of a sample of this plant has recently been made in the laboratory and the subject is discussed in the Scientific Officer's Paper No. 107 which appears in this issue of the *Chronicle*.

The work in progress in the Laboratory at head-quarters was detailed in the Scientific Officer's Annual Report and this work is being carried forward, and it is expected that Mr. Anstead will be at head-quarters for the next few weeks.

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore Planters' Association.

Proceedings of the Annual General Meeting held at Balehonnur on August 4th, 1912.

PRESENT.—Messrs. C. H. Browne, Thos. Hunt (President), C. S. Crawford, E. H. Young, W. H. Reed (Honorary Secretary.) *By Proxy.*—Messrs. C. Danvers, H. G. Bonner, S. L. Mathias. *Visitor.*—Mr. Frattini (Assistant Scientific Officer.)

HONORARY SECRETARY'S REPORT.—"Gentlemen,—It is with great regret that I have to record the death of Mr. Trevor Roper whose loss will be keenly felt amongst us all. Owing to our financial year having been altered from January—December to July—June I have nothing of importance to report, as very little has been done during the past 6 months. Subscriptions have come in nicely and I must thank members for the prompt way in which they have paid up. Owing to the enhanced subscription several estates have been withdrawn, one estate has seceded to the Bababudin Planters' Association and two have failed even to reply to my repeated requests for their subscriptions. There are now 54 estates on the roll representing 10,284 acres, the total amount paid in subscriptions up to the 30th June is Rs.2,958-3-0 eleven estates have paid up in full and the rest for the half year ending 30th June. To meet the 1st instalment due towards the Assistant Scientific Officer Fund Rs.875 was borrowed from the Bank, this has been paid back plus Rs.12-15-9 interest. Out of the sum of Rs.157-7-0 interest on deposit account Rs. 63-1-0 has been placed on deposit thus bringing the deposit account up to Rs. 4,000. The balance has been placed to Current Account. A "Reserve Account" has been opened with the Bank and the Deposit receipt on Rs.4,000 is held by the Bank as security against overdraft. I have nothing to report on "Benevolent Fund" account as my predecessor has closed it to June 1912. I beg to submit my resignation of the Honorary Secretaryship."

ELECTION OF OFFICE-BEARERS.—The following were elected: Messrs. Thos. Hunt (President), C. S. Crawford (Vice-President), W. H. Reed (Honorary Secretary.)

MYSORE EMIGRATION ACT.—This Association is in favour of an Emigration Act in so far as it enables them (Mysore Government) to control the recruitment of coolies in the State to places outside British India.—Carried unanimously.

DASARA DELEGATE.—Mr. Thos. Hunt was elected to represent this Association.

COFFEE STEALING CONVICTIONS.—Mr. Pilkington's Case. Resolved that Rs.50 be given to the informer, Arni Sinappa.

COUNCIL OF MYSORE PLANTERS' ASSOCIATION.—The idea of a Council is approved of, but North Mysore is only prepared to form part of the Council provided the voting powers are arranged on an acreage basis.—Carried.

MANURIAL EXPERIMENTS.—This Association accepts with pleasure the Kalisyndikat's offer. A vote of thanks was passed to Mr. Anstead for the trouble he has taken in this matter.

Proposed "That the Honorary Secretary do write to the Scientific Officer asking if he can make arrangements by which the members of this Association may get their manures and soils analysed at a fixed and moderate price".—Carried.

TWO ANNA BASIS OF SUBSCRIPTIONS.—Resolution at meeting held on 13th May 1912 was confirmed.

U. P. A. S. I. AGENDA.—The subjects on the agenda were gone through and instructions given to the Delegate.

BASRECUTTY POUND.—It was decided "That Mr. S. L. Mathias' petition for a Cattle Pound at Basrecutty be forwarded to the local authorities with a recommendation that the petition be granted."

(Signed) W. H. REED,
Honorary Secretary.

THE USE OF FORMALIN ON RUBBER PLANTATIONS.

An article in the *Journal d'Agriculture Tropicale*, for January 1912, p. 15, by V. Cayla, refers to a warning that has been given already by that journal against the belief by planters that formalin is an anti-coagulant. Formalin actually prevents coagulation only in an indirect manner; it acts as an antiseptic. Through its interference with bacterial activity which would cause acidification of the latex, it indirectly prevents the coagulation of Hevea latex, which is produced in an acid medium. The explanation is necessary, because it may be alleged that the formalin itself prevents the coagulation of the latex. It is actually a coagulant. At a strength of 1 per cent. in water it is inactive as a coagulant, and in this proportion it is, if not antiseptic, at least capable of inhibiting bacterial life.

There is, however, a more complex question concerning formalin which, it is believed, has not so far been considered. The formalin (or formol) of commerce is theoretically a solution of formaldehyde at a strength of 40 per cent. When it leaves the manufacturer, it probably answers to this description; but the numerous changes that formaldehyde may undergo when it is kept for some time in solution are unknown, and the result is that when the formalin of commerce is being used, one hardly knows the real nature of the substance. It is possible that certain commercial kinds of formalin, at the time that they are being used, do not contain any trace of formaldehyde, but only modifications of that compound.

In the opinion of the writer of the article, these circumstances provide the reason for the great discrepancy that exists between the results of different investigators, in experiments in the coagulation of rubber latex by formalin, notably in the work of Chevalier, Christy and Fickendey. Although these experimenters worked under almost the same conditions, the reactions noted by them were different.

To summarize the matter, it is the belief of the writer that three points have to be remembered concerning formalin, in the special connexions it is a coagulant; it is an antiseptic; and it is a body of which, at the time of its use, one never knows the actual composition, and consequently there is the accompanying ignorance as to its coagulating value.

LIME AND ITS APPLICATION TO THE SOIL.

A plant will not grow in the absence of lime, but this substance is so widely distributed in nature that practically all lands contain sufficient lime to supply the needs of the plants that may be grown on it. Some time ago a paper was read by Mr. W. H. Harrison, M. A., before one of the South Australian Agricultural Societies, on the subject of the application of lime to the soil, and the reasons for so applying it:—

“Lime is very extensively used as a fertiliser, but its action is not generally well understood, and serious mistakes often occur from its indiscriminate use. Most soils contain all the elements of plant food in varying quantities, but, however, abundant the presence of most of these essential constituents, if any one of them be absent, the soil is perfectly barren, and if present in insufficient quantity the resulting crops are unsatisfactory to the extent of that deficiency. Lime cannot be classed among these deficient substances, for, although it enters into the composition of almost all forms of vegetable life its various compounds are so widely and generally distributed that it would be a very rare circumstance for any sample of ordinary soil to be found on analysis not to contain sufficient lime for the requirement of any cultivated plant. Then it may be asked, how is lime a fertiliser? Anything is a true fertiliser which causes a plant to make more vigorous growth and yield a better crop; and lime does this in a twofold manner—*viz.*, chemically and mechanically. First, as to its chemical action, all plant food to be available must be in a soluble condition. Otherwise it is like human food under lock and key. All soils contain animal and vegetable matter in varying proportion and in various stages of decomposition. Now lime, in its caustic condition, is one of the most powerful agents of decomposition, and where, from defective drainage or other causes the land is ‘sour,’ and where organic matter does not readily decompose, the application of caustic lime often works wonders, causing these previously inert substances to yield an abundant supply of available plant food. Probably this use of lime on land damaged by seepage would act beneficially. Again, lime and its compounds sometimes react with injurious mineral substances producing useful or harmless compounds, *e.g.*, the action of gypsum on carbonate of soda. The mechanical action of lime on heavy clay lands is an important aid to fertility, causing the soil to become friable and thereby giving free access to air and water. This mechanical action is shared by several of its compounds, such as gypsum, powdered chalk, pulverised shells, &c. The common mistakes in the application of lime as a fertiliser are the following:—When its *chemical* action is required on sour, boggy land, it should be spread and ploughed in as soon as possible after being slaked. It is often allowed to lie in heaps for weeks and months, when it absorbs carbonic acid from the atmosphere and becomes gradually converted into carbonate of lime or chalk. When spread and allowed to remain for some time before being ploughed in, the mischief is still greater. Considerable damage sometimes occurs from over-liming. Since caustic lime greatly promotes decomposition, there is a danger of bringing too large a proportion of plant food into available form, resulting in a heavy crop in the ensuing season and comparative barrenness for several years after. It is a common practice to add lime to nightsoil and other animal manures. Caustic lime sets free the ammonia, thus depriving the manure of one of its most valuable constituents.”—*The Queensland Agricultural Journal*.

RUBBER.

Rubber in the Malay States.

The Director of Agriculture in the Federated Malay States has recently issued his Annual Report and the following extracts from it are quoted from *The India Rubber Journal*.

It is noticeable that three new appointments have been made on the Scientific Staff, a Mycologist, a Chemist, and an Assistant Superintendent of Government Plantations. Each year South India are left further and further behind in the march of Scientific progress.

During 1911, 107,200 acres of Rubber were opened, and the total output of Rubber for the year was 21,809,617 lbs. The producing acreage is returned as 105,653 acres, so that there is an approximate all round yield of 200 lbs. per acre, but it must be remembered that some of the acreage only came into bearing in 1911 and was only tapped part of the year, and abnormally dry weather was experienced at the beginning of the year. The total acreage planted at the end of 1911 is given as 352,074 acres.

Discussions still continue as to the best planting distances, though wider planting has become more and more in favour. Mr. Brain states that he does not think that any observer going round some of the older clearings and seeing the manner in which closer planted trees are crowding their foliage together, are losing their lower branches from light starvation, and are failing to renew their bark properly, can fail to come to the conclusion that a hundred trees to the acre is the maximum number that should be allowed. Even if this is reduced to 80 by accidental losses, and by disease and pests, there would still be ample number to occupy the ground and air. Whether planted 20 by 20 or 13 by 15 is a matter more of convenience in working than of any fundamental importance.

Catch crops are still little in favour and practically only used where it is absolutely necessary to secure a certain amount of revenue before the rubber trees come into bearing. In the F. M. S. only 13,382 acres under rubber are interplanted, or less than 4 per cent. Coffee Robusta accounts for 5,411 acres of this total and is the principal catch crop grown. Over 2,000 acres are under rubber and cocoanut, which Mr. Brain describes as a particularly unsound mixture of two particularly sound cultivations. Sugar gambier, tapioca, and pepper probably account for the remaining unplanted area. In the Straits Settlements 9,000 acres, or 11 per cent., are interplanted. In both districts there is an actual decrease in the interplanted acreage.

The Department of Agriculture is still experimenting with a view to finding a suitable cover crop, some 20 species of leguminous plants having been tried at Kuala Lumpur during the year. The ideal to be arrived at is a rapidly growing plant which quickly shades the soil sufficient to keep down the weeds. It must also have a short life, so that within a year it can be cut down, dug in, and resown, thus providing for cultivation as well as eradication of weeds. The cultivation usually given to rubber trees is hardly worthy of the name, consisting in the majority of cases of scraping the surface of the soil to remove the weeds. In Mr. Brain's opinion more than this is required to induce and maintain healthy soil conditions. At least once a year, if not twice, it would be advisable that the soil should receive thorough cultivation to a depth of at least four inches. In many cases, he says, the condition of the soil would be further improved by the

addition of lime. A large number of enquiries have been received during the year as to the advisability of manuring. While in certain cases, manuring may be required as shown by backward growth and the starved appearance of the rubber trees, yet Mr. Braia is of opinion that this is not so in most cases.

Tapping of rubber trees is an important matter, both as regards the quality and the quantity of the bark removed. As regards the quantity of the bark removed, a conservative procedure is more and more coming into favour, and very few estates now allow less than four years for renewal of bark. A research is being carried out by Mr. Bateson, Assistant Mycologist, on the depletion of the food reserves of Para rubber trees by tapping and the natural demands on the vitality of the trees. The quality of the tapping, the number of cuts to the inch, and the proper depth of the cut is a subject in which the planters, as a whole, are keenly interested. Twenty cuts to the inch is a very good average, although a good many more than this are claimed by some estates. When it is considered that a good coolie will do over 1,000 cuts per day, in addition to bringing in his latex, washing cups, pails, etc., it is evident that it requires highly skilled labour to avoid all mistakes.

With a view to testing the actual commercial value of the raw rubber produced in the country, the purchase of an experimental vulcanizing plant has been approved for 1912. When this is installed it is hoped that the Department will be able to make definite experiments on the commercial value of rubber produced by different processes. It is not expected that this will be in working order until the end of 1912.

The Agricultural Chemist has been working nearly all the year on special research work on rubber coagulation and curing. A large number of interesting facts have been ascertained, and a report on the subject will shortly be published. A small experimental smoke house of the Kent hop drying type has been erected during the year, and has proved very useful.

Plantation Rubber Preparation.

Messrs. Wm. Jas. and Hy. Thomson, the well-known rubber brokers, says *The India Rubber Journal*, have just issued an interesting Circular containing a number of suggestions regarding the preparation of plantation rubber for the London market, formulated by Mr. Roger E. Thompson, who has lately returned from a visit to Ceylon and the Malay Peninsula, where he went for the purpose of studying the preparation of plantation rubber.

Throughout the whole of Malay and Ceylon, says the Circular, the general preparation of plantation rubber is of quite a high standard, but few as yet have thought seriously enough of further improvements and economics that are possible in many details.

One of the leading questions put to the Managers of estates was, "What percentage of dry rubber of each grade do you make from the daily intake of latex and scrap?" In many cases the answer was that they could "work it out," but more often the idea appeared to be a new one to them, except as as a more or less vague guess at the proportion of first latex. To this generally there were, of course, a few notable exceptions.

Mr. Thompson soon saw that the best method of counteracting this attitude was to formulate what may be called an ideal system of make, which he put before various Managers for purposes of discussion, and found without exception that they were willing to fall in with his ideas and to grasp their importance.

The following is the basis of the system suggested :—

That No. I grade should be made from the first latex carefully strained into the coagulating receptacles and made into either crêpe or smoked sheet according to instructions. It is a good plan to bulk the latex brought in from different divisions of the estate so as to ensure a uniform colour in the day's make.

No. II grade from the naturally coagulated lump which should be carefully removed from the pail *before* the latex is poured into the strainer, and made into crêpe.

No. III grade from the scrap pulled off the trees, made into crêpe.

No. IV grade from the bark shavings, made into crêpe.

No. V grade from the earth rubber, made into crêpe.

All crêpe should be made the same day as the latex is collected, as by keeping it overnight it is sure to lose colour through oxydization.

Daily percentages of dry rubber made of each of the above grades should, continues the Circular, be carefully registered, as it is only in this manner that the Manager can check the quantities of each grade that his labour force is collecting.

Another important reason for knowing the percentages is, in case the owners of a plantation wish to make forward contracts for the whole of their out-turn, they will then be in a position to indicate to the buyer the percentage of each grade that he may expect to be delivered to him monthly, which at once enables him to make a closer price.

It is obvious that the ideal to work for is to make as big a percentage of first grade rubber as possible, and any method by which No. I grade can be increased at the expense of No. II., and No. III at the expense of No. IV, and so on, it is easy to see, will result in a more profitable return; bearing in mind that No. I is of better quality than No. II, No. II better than No. III, etc.

To return once more to the grading mentioned above. No. II hitherto has been made up into crêpe of a more or less spotted appearance owing to the lump having been poured wholesale into the strainer together with the latex; the said lump being used very often for rubbing the latex through the fine wire mesh, thereby gathering up all the dirt on the strainer, and spoiling what can be made into quite a fine, clean crêpe, in some cases very nearly, if not quite, equal to first latex. This lump also is very often made up with No. III grade, thus spoiling clean latex by mixing it with tree scrap.

On plantations where cup washings are collected in a second pail, the resulting latex will possibly be good enough to go into No. II, but it must not be added to it if No. II thereby suffers in colour. Where cup washings are not collected at the time of lifting the cups, and instead, the film of rubber adhering to them is pulled out of the cups from time to time, the result should go into No. III.

Of course, this varying distribution of rubber collected, amongst the different grades made, must be at the discretion of the European in charge of the factory, as the method of work and collection on each plantation is bound to vary to a certain extent; but the necessity for greater care and organization in the preparation of rubber is obvious, as these "minor economies," which, at the present profitable price of rubber they may be called,

will some day figure largely as the margin of profit becomes less, and there may be other factors in the market that we shall have to consider, beyond the mere question of over-supply, that will necessitate the strictest economy in the cost of production.

One other point that is of importance is to make sure that no fine splinters of wood are allowed to come into contact with the rubber; there are two sources of this trouble. One is, the rough planing of the insides of the wooden chests, and the other, the rough and splintery battens that are sometimes used, upon which the crêpe is hung up to dry. Both these defects should be fairly easy to avoid. The Manager must insist that the Momi chests supplied to him are well planed and smooth inside, even if he has to pay a few cents more for them, and he should also see that his battens are carefully sandpapered over, and splinters entirely removed. It may be added that a well-known F. M. S. Planter, who is now at home on leave, has seen the above and entirely endorses these views.

Rubber in Bengal,

In a statement dealing with the administration of the forests of India, says *The India Rubber Journal*, presented to Parliament by the India Office, it is said there are 96,000 square miles of reserved forests, and outside the reserves about 150,000 square miles of State forests. In Bengal the cultivation of *Ficus elastica* for rubber will probably not be continued as it does not seem likely that it can compete with Pará rubber. In Burma further experiments were made with the cultivation of rubber, and Pará rubber is said to be growing very successfully in the Bhamo Division. In Eastern Bengal and Assam the Charduar and Kulsi Plantations of rubber produced satisfactory results, and its cultivation is being extended to the Lushai Hills and elsewhere. In the Andamans attention is also being paid to the cultivation of rubber.

The Physical Constitution of Latexes in "The Rubber Industry"

An interesting paper was read by Mr. H. C. T. Gardner on this subject and on the relation of coagulation thereto. The author first discusses the composition of the latex and points out that the rubber globules must be distributed in the aqueous serum in a state of emulsification, since otherwise, as rubber is lighter than the serum, the globules would rise. He further points out that emulsification is closely connected with surface tension. Mentioning the view that coagulation depends on the destruction of a film of protein surrounding each rubber globule, he quotes Spence, who found that more than half the proteid of the latex of Hevea and Funtumia can be removed without coagulation taking place. He also mentions some experiments of his own with various latexes, which show that after the protein has been acted upon by a ferment, and then removed by dialysis, coagulation did not occur. This point is certainly extremely important, and it is to be hoped that the author may be able to pursue it further. He concludes that coagulation is a purely physical process "that the albumins (proteins) while probably acting as emulsifying agents, are not concerned in de-emulsification and each rubber globule is surrounded, probably, by a discontinuous film of particles either liquid or solid and the permanence of the physical equilibrium of the latex depends on the viscosity of the emulsifying agent and on the magnitude of the caoutchouc globules, i.e., the smaller their size the greater the viscosity."

It appears impossible to come to any definite conclusion without further experiments, but at all events the view, that the albumins probably act as emulsifiers but are not concerned in de-emulsification, seems to require considerable qualification.—*India Rubber World*.

The Planters' Chronicle.

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Contents of present Issue.

A short account is given of an interview between Mr. Goodfellow, Attorney for Messrs. Carson & Co., of Colombo, and the Secretary about the recruitment of Labour.

A letter from Lieut.-Col. Gayer, Assistant Director of S. & T. 9th Division in regard to Petrol Driven Lorries is reprinted, as it is considered to be a subject of importance to Districts not closely in touch with railways; and suggestions are invited, especially as regards rates on which to base a reply. Only one reply has so far been received, which, though interesting is not very illuminating; but is published *pour encourager les autres*.

Two letters are published, and will it is hoped lead to others of general interest, and the Managing Editor would be obliged if readers who do not care to submit original matter, would send in cuttings from their papers, that would lend variety to the *Planters' Chronicle*.

The Scientific Officer contributes two papers of great interest to the planting community, one entitled 'Lime in Basic Slag' and the other on a New Fertiliser known as Bernard's Phosphates.

Coolie Recruitment and Emigration to Ceylon.

It will be remembered that a good deal of outspoken criticism took place at the last Annual Meeting when this subject was brought up by Mr. Dickins of the Shevaroyes. That criticism appears to have evoked from the Ceylon Press language of an unnecessarily virulent and violent description. A bad case is generally backed up by vituperative language. After the Annual Meeting was over Mr. Goodfellow called on the Secretary to explain and to apologize for the conduct of his recruiters in distributing the leaflets amongst Mr. Dickins' coolies and in the bazaars near Estates, without his knowledge or sanction; and the Secretary has it in writing from Mr. Goodfellow, the Attorney of Messrs. Carson & Co., of Colombo, to the following effect:

"Should any recruiter distribute this notice in or near any Estate or Estate bazaars, he will immediately be discharged."

The Secretary also procured in writing from Mr. Goodfellow; "Nor to employ any petty official to assist in recruiting."

Mr. Dickins has rendered yeoman service in drawing general notice to this very important matter.

Scientific Officer's Papers.**CVIII—LIME IN BASIC SLAG.**

Basic Slag is a very widely used fertiliser on estates in Southern India and its particular value on the type of soil to which it is applied which contains only a small percentage of calcium oxide and carbonate lie in the fact that it contains a large proportion of lime and it is alkaline in reaction, while at the same time its phosphatic content is easily soluble in weak acids and is therefore readily available for plants.

It is a common belief that Basic Slag contains a large proportion of "free lime", that is lime as calcium oxide. This is a statement which will be found in many of the standard text books on Agriculture, but it was shown by Mr. J. Hendrick, B. Sc, to be a fallacy. In 1909 he published a paper on the subject in the journal of *The Society of Chemical Industry* (xxviii-14) in which he showed that if the free lime present in Basic Slag is carefully determined it will usually be found to be under two per cent.

Basic Slag is a bye-produce from the manufacture of steel by the Bessimer process and when this process was first invented a greater excess of lime was used than is done at the present day. There have been great alterations in the process during the last twenty years and the composition of the bye-product, Basic Slag, has altered accordingly.

While the amount of free lime in Basic Slag is then in reality very small, this in no way detracts from its value as a fertiliser for it contains a large amount of lime which is available as a base. From an agricultural point of view it is this lime available as a base which is important and not merely the free or caustic lime. Lime which is so loosely combined as to be capable of neutralising acidity and acting as a base during the processes of nitrification by the soil bacteria is what is needed in the soil, and this Basic Slag supplies to a high degree.

Hendrick's investigations show that the basic lime in Slag is not only a variable quantity but that it consists of lime in various forms of combination. A little of it is free caustic lime, the rest is in combinations such as silicates and basic phosphates. A part of this combined lime is readily liberated and will probably readily act in the soil as a base; other portions are only liberated with greater difficulty and slowly. As the conditions are very complex it is impossible to draw any line and state an exact percentage of basic lime in Slag except in terms of a strictly defined method of determining it.

Having recently had the necessity of making an analysis of some Basic Slag in my laboratory, Hendrick's methods were adopted. The results are published elsewhere in this number of the *Chronicle* (see Scientific Department) but it may be said here that a higher percentage of free lime was obtained than Hendrick got in the samples he examined, namely, 4% but that his point is fully borne out, for the Lime available as a base was found to be over 14%.

All this may appear to the practical planter as of little moment, but it is as well to be correct in our ideas and to give up talking of and thinking of the lime Basic Slag as being "free" and to think of it as being available as a base in the soil.

RUDOLPH D. ANSTEAD,
Planting Expert.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

A New Fertiliser.—In July a sample of a new Phosphatic Fertiliser was received from Messrs. Peirce, Leslie & Co., Ltd. This is called "Bernard's Phosphate" and very much resembles Basic Slag. It is a fine white powder, so fine indeed that it practically all passes a sieve with 100 meshes to the inch. The fineness of Basic Slag and similar fertilisers is a very important point. They are only slightly and slowly dissolved by weak acids such as are found in the soil, and therefore they must be well incorporated with the soil and expose as large a surface as possible to the action of the solvent in order that the phosphoric acid present may be got into solution and thus become available to plants. It was only when machinery was invented to grind Basic Slag very fine that it became suitable for use as a fertiliser. Fineness is usually expressed by the percentage which will pass a sieve with 100 meshes to the inch. Thus when Basic Slag is said to be 95 fine, it means that 95% passes the standard sieve. The sample of Bernard's Phosphates was 99·9 fine.

Messrs. Peirce, Leslie & Co. inform me that this new fertiliser is a Belgian product and that it is made with "Phosphated Fossil Chalk as used in steel works for the manufacture of high grade Basic Slag."

An analyses of the sample was made and at the same time a sample of Basic Slag kindly supplied by Messrs. Peirce, Leslie & Co., was analysed to act as a comparison. These analyses are given below together with some figures showing the comparative cost of the two fertilisers.

			Bernard's Phosphate.	Basic Slag.
Total Phosphoric Acid (P_2O_5)	...	...	27·03	18·87
Citrate Soluble Phosphoric Acid	...	...	4·38	16·15
Total Lime (CaO)	...	...	29·26	32·13
Free Lime	...	...	10·25	4·20
Lime available as a Base	...	...	22·54	14·28
Insoluble matter	...	...	5·03	13·56
			Rs. A. P.	Rs. A. P.
Price per ton	...	...	60 0 0	65 0 0
Cost of a Unit of Phosphoric Acid	...	...	2 15 4	3 7 1
Cost of a pound of Phosphoric Acid	...	...	0 2 1·36	0 2 5·5

It appears therefore that though Bernard's Phosphate is a cheaper form of Phosphoric Acid than Basic Slag it is not in such an available form, very little of it being soluble in Citric Acid, and it will be a slow acting fertiliser. It contains a large amount of "Lime available as a base," the significance of which item is explained in the Scientific Officer's Paper in this issue of the *Chronicle*, and it is undoubtedly worth a trial against Basic Slag. Messrs. Peirce, Leslie & Co., are prepared to supply small quantities of it at specially reduced rates in order to induce experiments being taken in hand.

Preparing Botanical Specimens for Transit.—It often happens that correspondents forward to me a flower, or a few leaves, or some portion of a plant, with the request that I will name it for them. It is next to impossible to identify a plant from such material. The Colonial Botanist in a recent number of the *Queensland Agricultural Journal* gives the following simple and explicit directions for collecting botanical specimens which have to be sent by post for naming, and future correspondents cannot do better than make a note of these directions and follow them exactly.

"A botanical specimen is such a portion of a plant as may enable a botanist to determine its name, &c. Thus, of a tree or shrub, a shoot, say 6 inches or 9 inches long, bearing leaves, flowers, and fruit, if possible, will be sufficient. Of herbs when small, an entire plant should be sent, collected when in flower. Of herbs of a large size, a portion of the lower (radical) leaves and also a portion of the top, in flower or seed. All specimens should represent the typical form—not an abnormal or irregular growth, except to show such growth. After gathering, place the specimen between sheets of paper (old newspaper), and put the whole under a slight pressure; these papers should be changed for dry sheets every day for three or four days, when, if the specimens are not of a succulent nature, they will be in a fit state to forward by post."

Camphor.—In view of the increasing interest which is being taken in the cultivation and preparation of Camphor in Southern India the following synopsis of a paper by Lommel on the preparation of camphor from dry leaves given by Messrs. Schimmel & Co. in their Semi-Annual Report for 1912 will be of interest. When using a small still only it would be of advantage to use dry leaves and this increases the camphor content of each charge, and the method is well worth a trial by those who are experimenting with Camphor distillation on their estates.

"The author first deals with the distillation of leaves which had been spread out for drying in a small cinchona-plantation shortly before the setting in of the rains, but which were not yet quite dry. The Camphor yield from these leaves was too small to make it worth-while estimating it, and the experiment was set down as a failure. For a subsequent distilling-experiment a plantation was subjected to moderate cutting, when a quantity of dry fallen leaves was found on the ground between the rows of plants. These were first distilled and only yielded 0.06% crude camphor and 0.19% camphor oil, showing that they had lost almost the whole of their volatile constituents during the long time they had been lying on the ground drying, exposed to the alternating effects of rain and sun.

"Next the green leaves were dried on previously cleaned ground under the shade of cultivated cinchona trees. In the course of about a fortnight they were dry enough to be readily stripped from the branches and, collected in sacks, they were carried to the still. The experiment gave a thoroughly satisfactory result, the yield being 1.55% crude camphor and 0.49% camphor oil. The result would certainly have been better still but that on one occasion, in the course of the distilling process, the condensing-water became heated, and a not inconsiderable quantity of camphor was thereby lost.

"In view of the fact that present experience on the effects of cutting upon the growth of trees shows it to be a pretty well established fact that it is possible to cut the trees twice a year, it is reasonable to expect a five-year old plantation to yield about 8,400 lbs. of dry leaves per acre. This would be equivalent to an out-put per acre of about 325 lbs. of camphor and about 103 lbs. of camphor oil."

The Scientific Assistant for Mysore.—Mr. G. N. Frattini has spent several days investigating the Limestone deposits near Birur and the method of working them. Samples have been taken and forwarded to head-quarters for analysis. These deposits appear to be extensive, and should the raw material prove of a suitable kind, it is possible that something might be done to exploit them as a cheaper source of Lime for some of the planting districts than any which now exists. On 1st September, Mr. Frattini began a tour of South Mysore, proceeding to Subbanhulli Estate, from whence he went on the 6th to Bettadmame Estate.—R. D. A.

CORRESPONDENCE.

Petrol Lorries.

The Managing Editor.

Sir,—I read with interest the notice in the *Planters' Chronicle* of August 17th with regard to the employment of Motor Lorries by planters and in reply have to state

(1.) planters in these parts would, I should say, at least I would, be only too glad to employ them to take coffee down to Mangalore during crop time if

(a) the authorities would take the coffee at a reasonable rate per ton.

(b) If the lorries could not get up to all the estates to come as near as practicable, the present route for coffee from these hills is very unsatisfactory, *viz.*, it goes by cart to Birur and from there by rail to Marmagao, then put on board a steamer to go *south* to Mangalore, discharged into boats and landed at Mangalore, carted to Works and when ready is carted from Works to Bunder and loaded into boats, transferred to steamer to go *north* again to Bombay, where it is once more transhipped to P. & O. and warehoused till a steamer is available.

Whereas Mangalore is only 95 miles from Chikmagalur and this Estate is 44 miles from Chikmagalur, others nearer.

A question for the authorities to ascertain is whether the culverts, bridges, etc., on the road are capable of carrying the lorries with their loads and if not whether the Governments through whose territories the road passes will make them so.

In my opinion a great use might be made of petrol driven lorries in this country. In England it is overdone to the detriment of the roads, but in this country nothing is done.

Yours faithfully,

Kesinvurthy Estate, Santaveri,

(Sd.) G. R. OLIVER.

Birur, S. M. Ry., August 28, 1912.

Labour Bureau.

The Editor,

Planters' Chronicle.

Dear Sir,—It has come to my notice that the Mysore Government are proposing Relief Works on account of scarcity in certain taluks.

Would it not be possible for the Mysore Planting Associations to approach the Government with a view to assisting us—the Mysore Planters

—first and incidentally themselves by enabling us to get some of the coolies who need relief. A Labour Bureau in fact, one more Bureau won't matter. Government do nothing for us, and we suffer dreadfully from legislation *re.* cooly contracts in the local courts and from the extradition nonsense. What I would suggest would I imagine not cost Government ten rupees to a thousand otherwise spent by them.

I think 3 or 4 Government officials on about Rs.30 each one with 3 peons for work—collecting, escorting, &c., would be enough for a taluk—and we should get all the labour we need in 3 months' time. There is always the possibility that some of these coolies might come another year.

I should propose we pay a Bonus on coolies landed, to the Bureau, and it should cover all expenses of Government if these are people needing relief.

I would for various reasons keep the advance down to not more than Rs.250 or 300 to each maistry or patel advanced.

I've every belief in some such scheme *with Government assistance.*

It is early to discuss details, but we need action *now.*

I am,

Dear Sir,

Chikmagalur, 1—9—12.

Yours truly,

(Sd.) H. W. RAIKES.

THE CHINA TEA CROP.

The *Daily Telegraph* has received from its special correspondent in Shanghai the following important information in regard to the new crop of China tea:—"The improvement in the political situation," he writes, "has solved the financial difficulties of the tea trade, and there is no reason to except a curtailment of supplies. A surplus rather than a shortage is probable. The first crop supplies are arriving at Hankow normally. Prices in London are 10 and 15 per cent. higher than those of 1911, owing to the advance of sterling exchange. The lowest quotation to date is 5½*d.* cost, freight and insurance for good Congou, but a drop in the market is probable. The quality is satisfactory, above the average, and especially free from traces of unsoundness. The crop is scarcely up to the standard of 1911. The spring is rather hot and dry for a first-class crop, but the liquor is strong and pure, with an entire absence of taint or weatheriness, and the leaf should keep well."

THE INDIAN TEA ASSOCIATION, (LONDON).

At the last Annual Meeting of the members of the Indian Tea Association held on the 9th July, 1912.

Mr. W. Skinner, Secretary, submitted

THE ANNUAL REPORT

which stated (*inter alia*) that the quantity of Tea exported from Northern India, *via* Calcutta and Chittagong, between the 1st April, 1911, and 31st March, 1912, amounted to 245,341,948 lbs. against 238,382,478 lbs. for the previous year—an increase of 6,959,470 lbs.

The quantity of Tea exported from Southern India during the same period (1st April, 1911, to 31st March, 1912) was 18,985,168 lbs., as compared with 18,617,708 lbs. in 1910-11, and 16,616,154 lbs. in 1909-10.

The total exports from Northern and Southern India by sea were, therefore:—

1911-1912	...	...	264,327,116 lbs.
1910-1911	...	...	257,000,186 „
1909-1910	...	...	251,852,667 „

In addition to the above, 454,720 lbs. went by rail from Calcutta to Bombay during 1911-12, against 154,323 lbs. in 1910-11.

The Committee is indebted to Mr. Reade, the Principal of H. M. Customs, Statistical Office, for the following statement of the quantities of Tea imported into the United Kingdom from China, British East Indies, Ceylon and other countries, during the calendar year 1911:—

Weight by	China includ- ing Hong- kong and Macao.	British East Indies.	Ceylon.	Other Countries.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.
Importers ...	24,947,144	188,559,936	110,231,309	27,368,110	351,106,499
Customs (after weigh- ing ...	24,701,844	186,013,336	109,500,881	25,930,353	346,146,414

With regard to the Scientific Department the Calcutta Committee have carried through negotiations for a site at Tocklai, and considerable progress has been made with the erection of the necessary buildings, which comprise a well-equipped laboratory and two bungalows, one of which will be occupied by Mr. P. H. Carpenter, the Assistant Scientific Officer, and the other by the Entomologist and Mycologist. The Calcutta Committee anticipate that the total cost of the new station will be about half a lakh of rupees, and they hope it will be ready for occupation early this year.

During the past year, two new officers have been sent out to the Department—a Mycologist and an Entomologist.

The question of bidding in one-eighth of a penny at Tea auctions occupied the very careful consideration of the Committee who passed the following resolution:—

"Where *one bulk* is divided, the Buyer's bid of say *7d. and drop* to be accepted as a bid for both lots, and no one else shall have the right to cut him out on the second or drop bid. Anyone, however, may secure the Tea by bidding *7d.* or higher for both lines.

"The new arrangement would only apply to Teas selling up to a limit of $8\frac{1}{2}d.$ per lb." This was rejected by the Tea Buyers' Association, who put forward the following reasons in favour of bidding in eighths of a penny at a Conference held to discuss the matter:—

"That the present advance of a farthing per lb. on Tea at say *9d.*, is out of proportion to its value, when compared, with the custom prevailing in other articles of produce, that Tea can be graded in eighths, is valued in eighths, and, therefore, should be bid for in eighths. Thirdly, that in all other markets of the world smaller advances on Tea are a rule and practice of the trade, *viz* : in Calcutta $1/12$ th of a penny; in Colombo $1/6$ th of a penny and in Amsterdam $1/12$ th of a penny. Fourthly, that over 90 per cent. of the buying power of the trade are strongly in favour of the eighth bid."

The Committee, however, after receiving the report of the three representatives who attended the above mentioned Conference, unanimously resolved that they could not agree to any alteration from $\frac{1}{4}d.$ to $\frac{1}{8}d.$ bidding at public auctions of Indian Tea, although they were quite willing to give a trial to their resolution of the 10th July. They also agreed that the new arrangement should supply to Teas selling up to $8\frac{3}{4}d.$ per lb., instead of $8\frac{1}{2}d.$ as originally proposed. This was accepted by the Buyers' Association, and the new system of bidding came into force at the sale of the 22nd January, 1912. Brokers report that it is working quite satisfactorily.

The Committee after very careful consideration came to the conclusion that it was desirable that the Tea Cess should be continued for a further period of five years and they have so advised the Calcutta Committee.

The Chairman, Mr. P. Russel, in moving the adoption of the report first referred to the loss which the Association and the whole planting community of Northern India had sustained in the death of the late Secretary, Sir James Buckingham.

With regard to the Tea Cess, the Chairman said that, the period for which the Cess runs expires on March 31st 1913 and with a view to deciding whether they should advise the continuance of the Cess, the Committee asked Mr. Ashton of Messrs. Shaw, Wallace and Co., to draw up a note explaining the history of the Cess. They were all most grateful to Mr. Ashton the very able manner in which he complied with their requests. After considering this note by Mr. Ashton and talking it over, the Committee came to the conclusion that the continuance of the Cess was desirable, and the requisite steps will now be taken to secure the views of members outside the Committee. Fairly full details are given in the report as to the work done this year. Though little progress has been made in Germany during the past year as compared with 1910, the figures are complicated by the abnormal increase in imports in 1909, prior to the imposition of a duty of $5\frac{1}{2}d.$ per lb. on tea. On the reduction of the duty to $1\frac{1}{2}d.$ per lb., which took place in 1906, there was considerable in-

crease in imports of all tea, and a marked advance in the proportion of Indian. Thus in 1905 the total import of tea into Germany was $6\frac{1}{2}$ million lbs., of which three-quarters of a million, or 11 per cent., was Indian tea; while for the three years 1909-11 the average annual import was $8\frac{3}{4}$ million lbs., of which Indian tea amounted to $1\frac{1}{4}$ million lbs., or 14 per cent. In Belgium, too, there has been an increase in the use of tea, though, as the returns do not differentiate between Indian and other teas, it is not possible to say what the increase in consumption of Indian tea really is. Still, we should all like to see more rapid progress, and the question of how this may be effected is engaging the attention of the Sub-Committee. There is, however, one point which he thought should be borne in mind, and that is, that it is much easier to increase your export trade or, in other words, the consumption of Indian tea in foreign countries, on a falling market, than it is on a rising market, such as we have had during the last year or so. The advertising campaign in the United Kingdom is being energetically carried on, and he thought we can claim that it works quite successfully. The evidence which we have from grocers all over the country is evidently genuine and shows increasingly good results. (Hear, Hear.)

The agreement with the Conference Liners for Shipment of our teas (the original agreement having expired) was running on under a six months' notice on either side, and during the year the Conference Liners informally brought to our notice the high rates that were ruling for rough cargo and the probability of those rates being maintained. They pointed out that the expenses of shipping companies had increased since the agreement was made, and they expressed a wish to settle the whole matter amicably without giving the formal six months' notice, which they thought would avoid unnecessary and, possibly, long-drawn-out discussions. The Committee felt that, although no doubt our previous rate had been a paying one for the shipping companies probably during most of the term of the agreement and the contract with us was a valuable asset to them, still it was true that wages and other expenses had gone up, and the Conference Liners had given us a good and regular service and were now meeting us in a straightforward and, as it seemed to us, a reasonable manner. Accordingly, a new agreement was come to, and from the course events have taken, we do not think we have much reason to regret the arrangement we come to. To that he had to add that the Sub-Committee appointed to go into the question have arranged for the Chittagong freight agreement to be run concurrently with the Calcutta agreement.

Referring to the dock strike which is at present troubling nearly every trade in the City of London. The Chairman said that of course, in our case, fortunately, it has taken place at a time when it causes us the minimum of inconvenience, but, probably, the shipment of our teas from India will be delayed, as so many ships have been hung up in London unable to load. As representing this Association, he attended two meetings, both being held at the Chamber of Commerce, one to endorse the action of the Port of London Authority in widening the licensing system for lightermen and the other to represent to the Home Office the necessity for adequate protection being given to the large number of men who were both anxious and willing to work and were only prevented from doing so by fear of the consequences. (Applause). He thought that these were both subjects that we are all interested in and it was as well to let the name of the Indian Tea Association appear as supporting those movements. (Applause). He would like to say with regard to that subject, that there may be some dislocation in the near future. Probably our teas will come along very slowly for some

time and then we will probably have a rush of supplies, so I think it is most necessary for us to keep a watchful eye on things and only supply the trade with such quantities as they can adequately deal with. (Applause.) He thought there was no doubt that these steamers that are held up here will probably all get away at once, or very nearly at the same time; they will arrive in Calcutta together, and the result will be several ships coming in here with large cargoes of tea at the same time. That is the chief danger; it seems to me, that we have got to guard against.

Then, touching on the labour question, the report states fairly concisely the point at which we have now arrived. The memorial to the Viceroy has been altered to meet the various opinions expressed in India, and, provided our friends there now approve it, it will, we hope, shortly be presented. The Government of India must recognise that the labour supply for the tea industry is of vital importance, both to that industry and to the new Province of Assam itself, and that for years to come that labour will have to be imported. No complaint can be made as to the treatment of the workers on the gardens, and the problem is to hit on the best plan to ensure a smooth inflow of labour into the Province. Government proposes to remove the provisions of Act VI. from the labour districts in Assam, as has already been done in the case of the Surma Valley, and at the same time expresses the wish to see the Contractor system under Chapter III. of Act VI. eliminated. Now we, are prepared to cooperate with Government on both these points, but Government must first show us definitely that the disabilities under which we have to work in the recruiting districts at present will be removed, or at any rate considerably lessened. (Applause). Again, it seems to many of us quite illogical that any system of recruitment of indentured labour should be allowed to remain in the recruiting districts if that for Assam is abolished—(hear, hear,)—especially when that labour is required for places outside India itself. (Applause.) The elimination of the Contractor is the most difficult part of the whole question, because unless he is done away with thoroughly our position will probably be worse than it was before. To abolish by notification would, he thought everyone would agree, be no good whatever, and Government will require to take very strong steps indeed to ensure the abolition being effective. Once Government has received our representations, a basis for further negotiations will be opened, as to the effective measures to be taken to safeguard Sardari recruitment in the future, and also as to the protection which may be afforded under the proposed Local Enticement Act, and I think at the same time we can justly claim free access over the whole of India for recruitment by our Sirdars. (Hear, hear).

TEA.

Effect of Nitrogen on Tea.

We have more than once been asked whether nitrate of soda can be used with advantage in tea gardens, but, being without really conclusive data on the point, have not cared to give a definite opinion one way or the other.

We have now received from one of our correspondents in Japan, who has made a special study of the subject, a very interesting statement as to the effects of nitrate of soda on tea in Japan, and, though the conditions

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there are not quite the same as in India, Ceylon, and China, the general principles may be said to be similar, so should interest growers at all these centres.

In Japan there are only three pickings, and the leaves are not "graded" as in other places where black tea is the product aimed at, all the tea for home consumption in Japan and for export to America being green tea. It must also be remembered that there are spring frosts in Japan, and sometimes considerable damage is done to the first crop by them. In many districts fish manure was the old-fashioned method for supplying nitrogen, but latterly it has been proved that there is a saving in the cost of manuring by the substitution of nitrate of soda for a part of the fish manure; at the same time the nitrate produces an increased yield on the first picking, with no diminution in quality.

It was found, too, that the application of nitrate had some protective influence against frost damage. In regard to the second picking, which is commonly reckoned at not more than 60 per cent. of the first, the inclusion of nitrate of soda increased the yield to as much as 90 per cent. of the first picking.

In practice the amount of nitrate applied is from 250 to 300 lbs per acre per annum in three or four applications, say, once or twice before the first picking, once after the first picking, and once after the second picking. It would, of course, be impossible to apply these experiences to places like Ceylon and India, where the raw leaves are "graded" and where an indefinite number of pickings take place. At the same time the results obtained in Japan should be of value, in that it seems that an increase of yield is obtained by the use of nitrate without any deterioration of quality. When one thinks of the stimulating effect nitrate has on a plant about to "flush" this is not surprising. It has always seemed to us that, assuming the quality is not affected, small applications of nitrate of soda would be beneficial on tea plantations, say, after each picking. Without personal experience of the climate and a first-hand study of the soils it would, of course, be impossible to go into detail in regard to any particular country or district, but it would be interesting to see the result of a "little and often" treatment with nitrate on a tea plantation, as a top-dressing, in such places as Ceylon and India, after the use of the usual manures. Whatever is done, however, in the way of general manuring, should be continued. Since nitrate of soda is such a quick acting fertilizer, and is especially valuable in producing young and tender shoots at short notice, its use must prove invaluable for stimulating a "flush" with tea if applied before picking; and it is only reasonable to suppose that tea is one of the crops which would particularly benefit by its use as a top-dressing.

Our Japanese correspondent mentions that he does not find it advisable to apply all his nitrogenous manure in the form of nitrate nitrogen. His experience is that 60 lb. of *nitrogen* per acre (*i. e.*, pure nitrogen) may be safely used on tea, and of this about half should be in the form of nitrate nitrogen and the remainder supplied by fish guano, soya-bean cake, or other nitrogen-yielding manures.

It may not be out of place to conclude by mentioning the export figures of Japanese tea as stated in the Yokohama Chamber of Commerce Year Book, to show the importance of this industry to Japan:—

Total exports of tea from Yokohama for seven years:—

		Kin.		Value (stg.) £.
1905	...	29,155,221	...	1,058,432
1906	...	30,021,278	...	1,076,709
1907	...	30,684,472	...	1,261,824
1908	...	26,662,971	...	1,115,837
1909	...	30,741,570	...	1,315,653
1910	...	32,946,417	...	1,454,233
1911	...	32,187,594	...	1,437,926

1 kin=601 grammes or about 19 oz.

1 gramme=.032 oz. 31½ grm.=1 oz.

Agriculture and Labour in the Federated Malay States.

During the course of a paper read at a meeting of the Royal Colonial Institute on 12th March, as reported in the journal of the Institute Sir Ernest W. Birch, K. C. M. G., when dealing with the subject of agriculture and labour said:—

"A great many forms of agriculture have flourished in Malay States. The chief of these have been tapioca, gambler, pepper, sugar, Liberian coffee, coconuts, rice and rubber. Of these practically only the last three remain, and with the exception of coffee, I do not regret the loss of others. Some day I hope that coffee may be revived.

"The first official mention of rubber in the Malay States is contained in the administration report of Sir Hugh Low for 1883. He wrote: "Specimens of rubber from six-year-old plants of *Heava Braziliensis* in the Government Experimental Gardens have been collected." In various parts of the Federated Malay States there are magnificent old specimen trees to be seen of huge size which will produce upwards of 20 lbs. of latex, but it was not till some ten years later that planters began to turn their attention to the cultivation of Para rubber for commercial purposes. Of recent years the Government has thrown itself heart and soul into the question of assisting the cultivation of rubber. It has established an Agricultural Department with a highly-paid Director, a Mycologist and an Entomologist. It has issued loans to a very large amount which for the most part have been since repaid. It has established a Labour Department to further Indian immigration, and it has listened to the Planters' Associations and brought in regulations dealing with the cultivation of rubber and sale of latex. As a set-off against this assistance it has decreed that all lands granted since 1905 shall after six years bear a quit rent of \$4 or 9s. 4d. per acre, and it levies an export duty of 2½ per cent. *ad valorem*. The climate with its constant rainfall is ideal for the growth of rubber, the soil for the most part exactly suitable, the road and rail communications of the very best and yet British people, representing large rubber interests in London have unfavourably compared the conditions in British Malaya to those of Dutch possessions in Netherlands India. But the Government of the Malay States is able to adhere to its conditions and meet the requirements of those who will still apply to it for land, and it knows, what others fail to realise that there is a vast amount of work before it in further extending its road system, in constructing branch railways to meet over-increasing centres of population, and in making the loan which it has guaranteed to Siam. In 1910 there were 245,000 acres under rubber, and twelve and a quarter million pounds of dry rubber were exported, worth nearly four and a half millions sterling."

(To be continued.)

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Contents of present Issue.

At the last Annual Meeting Mr. Hughes brought forward a resolution supporting the Karachi Chamber of Commerce in their contention that the money belonging to India would be better employed in building railways and communications in India rather than in being lent at very small interest and even at none at home. Severe and just as Mr. Hughes' comments were, they were mild compared to the article published in *Capital* by Mr. Webb, C.I.E. which is reproduced in these pages. It should be specially noted the secretiveness with which the Home Government has treated this vitally important matter.

The Scientific Officer continues his interesting series of article, and treats of Rubber in Mysore and the colour of Rubber ; Bees and Coffee Fertilisers and the Production of Tea in India. A programme of Mr. Frattini's tour of inspection is given which will be of great assistance to Mysore men who will know when and where they will find the Scientific Assistant on given dates.

Under the heading of Coffee, Crops and Supply are dealt with compiled from the Spice Mill, a late telegram from Rio Janiero should be of happy augury to coffee planters as to the continuance of high prices.

Another article is that of Fungus Notes which is interesting.

It may interest readers to know that Mr. Crawford and the Secretary visited Bishop Cotton School and saw little master Claridge who is being educated there and that a good report was given by the masters of the little boy's intelligence and aptitude both for work and games. From that very interesting biography of Lord Macaulay it will be remembered that he always used huge dabs of sealing wax when writing to his nephew at Harrow, and told him that the most important part of his uncle's letter lay under the seal, which on being melted down revealed the ever acceptable sovereign. Mr. Crawford very kindly unsealed himself on the occasion of the visit.

Several members of different Associations have called at the Office during the course of the month. Messrs. Crawford, Scholfield, Clode, Parton, Boyd, Brock, Scott, Brown Père at fils. Adventures are to the adventurous and Mr. Scholfield will long remember his first ride on a motor bike in Madras, getting on without knowing how to manage the motor, With magnificent courage, he started on his journey which continued till the petrol ran out, which was several hours after his start, and after having covered some three hundred miles round the Island. A record and a ride almost as memorable as that of John Gilpin.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Hevea and Ceará Rubber in Mysore.—There is a good deal of Ceará Rubber in Mysore in one place and another and it is growing very well. It is not a district which is usually considered suitable for Hevea, however, being too high and too dry as a rule. Despite this some Hevea is making good growth and has reached the tapping stage. At the recent Exhibition in connection with the Annual Meeting of the U. P. A. S. I., Mr. C. H. Browne exhibited some Hevea biscuits which were of the greatest interest since they were samples of the first Hevea Rubber which has been grown and manufactured in Mysore and actually sold in the London market, where they got a good report, and what is better still for the practical side of the question, high prices.

Some excellent Ceará biscuits were also exhibited and samples of a lot sold at the same time. Mr. Browne has kindly allowed me to reproduce the Reports on this rubber received from Messrs. Sanderson & Co., and from Davitt. Messrs Sanderson & Co., reported as follows, and valued the Hevea at 5s. 4d. per pound and the Ceará at 5s. 2d. per pound:—

“There is nothing to choose between these two samples as far as preparation is concerned, the Ceará sample is decidedly resinous, and for this reason will not fetch as much as the Hevea sample. The preparation in both cases is extremely satisfactory, and both samples would fetch full market price for the description. No doubt as the trees grow older the proportion of resin in the Ceará sample would be less.”

Devitt's report on the Hevea is “both samples are well up to fair average quality and compare very favourably with the best Ceylon biscuits,” and on the Ceará, “Fine clean pale amber Ceará biscuits, well prepared and in good condition. Rather less resin than usual. Quality above the average of this grade. Value about 5s. 1d. 5s. 2d. per pound.”

Colour of Rubber.—The *India Rubber Journal* of August 17 publishes two letters from Manufacturers of Rubber agreeing with the contention of that paper that Rubber should not be judged by its colour. “Dark rubbers which are now rejected are as good as, if not better than, lighter coloured kinds for many purposes,” and, “colour is no indication by itself of the quality of the rubber” says one Firm who always buy big samples and make their price from “the appearance and toughness” of the sample submitted to them.

The second letter states that, “the question of colour scarcely ever enters into our consideration at all in judging the quality of Plantation Pará, in fact we should be chary of accepting rubber which was particularly pale until we had thoroughly examined it.”

Bees and Coffee Fertilisation.—This subject was again raised by the Shevaroy Delegate at the Annual Meeting of the U. P. A. S. I. Last year the Government of Madras took the matter up and their Entomologist, Mr. T. Bainbrigg-Fletcher, was instructed to investigate. However, unfortunately the request came too late as all the Coffee blossom was over. It was decided to remind the Madras Government again this year and ask that the Entomologist might be allowed to study the subject. It appears, however, that it has not been forgotten, and it is possible that Mr. Fletcher will be able to pay a visit to the Districts more especially interested before the end of this year. This is advisable in order that he may be able to get an idea of the conditions prevailing on the Coffee estates and make plans for the carrying out of certain necessary experiments. As the coffee is in blossom for such a short time a plan of action should be decided upon sometime beforehand.

A reference to the Chronicle, Vol. VII. p. 419. will show the comments made upon the subject by the Government of Madras. It is there stated that "it has by no means been proved that bees are essential for the pollination of coffee." This is not quite the point that is of importance. Coffee can be self-fertilised, and there is little doubt that in some cases it is largely self-fertilised, and so bees are not "essential." But it is thought by some planters that self-fertilised coffee is not of such good quality as insect fertilised coffee, and that the great reduction in the number of bees in some districts, owing to their indiscriminate slaughter by native honey and wax collectors may be one of the factors playing a part in the much talked about deterioration of the quality of South India coffee. The effect of the reduction in the numbers of bees in coffee districts on the *quality* of the coffee, as well as on the actual quantity, is a point which needs investigation, and it is to be hoped that Mr. Fletcher will be able to throw some light into the present dark places and tell us how to improve the conditions with, or without, the help of Government."

Production of Tea in India.—A note on this subject prepared in the Office of the Director General of Commercial Intelligence has been received giving a number of very interesting statistics brought up to the year 1911. Returns have been collected from a total of 574,575 acres for the whole of India, of which 20,593 acres are credited to the Madras Presidency and 32,008 acres to Cochin and Travancore, though the returns from Cochin appear to be very incomplete. The production for 1911 is recorded as 268,823,436 lbs. for the whole of India, of which the Madras Presidency contributed, 5,795,407 lbs., and Cochin and Travancore 14,714,537 lbs. 1,601,911 lbs. of Green Tea are reported as having been produced in South India in 1911. It is interesting to note, as throwing some light on the consumption of tea in India, that during 1911-12 the balance between production and export was 15,515,552 lbs. It is pointed out that "the figures of production are far from accurate and consequently any estimate of the consumption *per capita* in India as a whole is vitiated at the outset." The prices of tea show a substantial increase as compared with the prices of the preceding year; the average price of Broken Pekoe during 1911 is given as 7 as. 9 p., of Pekoe, 7 as. 7 p., and of Pekoe Suchong 6 as. 9 p. The number of persons employed in the Indian Tea Industry in 1911 is returned at 526,460 permanently employed, and 87,502 temporarily employed, while the capital of joint stock companies engaged in the production of tea amounts to over seventeen million pounds sterling.

Scientific Assistant for Mysore.—Mr. Frattini who is making a tour of inspection in South Mysore will carry out the following programme as closely as possible:—

15th September ...	...	Barehunhulla Estate.
20th " ...	...	Hooli Hundloo "
21-26th " ...	...	Chickanhully "
27th " ...	...	Lingapur "
28-30th " ...	...	Baithney "
1-3rd October ...	...	Soondhully "
4-6th " ...	...	Oossoor "
7-8th " ...	...	Bargnai "
9-10th " ...	...	Ubban "
11 to 13th " ...	...	Karradi Betta "
15th " ...	...	Bettadmane "

R. D. A.

INDIA OFFICE FINANCE.

BY M. DE P. WEBB, C. I. E.

The recent debate in Parliament on the Indian Budget is remarkable for two reasons, firstly, to all appearances, almost everything under the sun was discussed at length except the Indian Budget; and secondly, the debate was closed at 11 p.m., thus putting an end for the time being to the possibility of any awkward charges of mismanagement or misapplication of public moneys being pressed home against the officials of the India office. I wonder if an Indian Budget debate has ever been closed before?

When introducing his figures, Mr. Samuel Montagu was most careful to avoid any reference to such strange matters as the holding of £8,000,000 cash *in London* against a Paper Currency that only circulates and is only redeemable *in India*. Mr. Montagu was similarly secretive with regard to the colossal cash balance of over £18,300,000 which the India Office held on the 31st of March last and which, in the absence of any need for the money on India's account, had been lent out secretly to various concerns in London, *in many cases without security* and at such miserably low rates as two-and-a-half per cent. Nor did he lay any stress on the fact that the securities in which the Secretary of State has invested practically the whole of the Gold Standard Reserve have already depreciated in value to the extent of over a million sterling—that they will in all probability shrink in value to the extent of another million or so—and that the whole £18,000,000 would be altogether unsaleable in the event of a great war or a great financial crisis, and consequently in a large measure worthless to India, possibly at the very moment when India most urgently needed them. These are little trifles, however, which it would perhaps be unreasonable to expect an Under-Secretary of State to touch upon when he was merely handling the Indian Budget.

I have remarked that the figures and details of the Budget were "to all appearances" neglected. As a matter of fact, in this case appearances were deceptive. One Member of the House, Colonel C. E. Yate, in the course of his speech propounded five extremely pointed questions in connection with the India Office's mismanagement of India's cash balances and reserves. Four out of these five questions have been carefully suppressed not only by the London financial press, but by all the London newspapers, including, alas, the great *Times* itself. Possibly the secret manipulation in London of £10/20,000,000 of India's spare cash by undisclosed borrowers at the expense and to the loss of the Indian tax-payer, is not a matter to which London newspapers think it desirable to make any reference. Be this as it may, the peoples of India are not likely to allow the incident to pass unnoticed. Here is the gist of Colonel Yate's enquiries:—

(1.) What is the reason that the cash balances held in London on behalf of the Government of India have steadily increased *every year* from £4,600,000 in 1907 to over £18,000,000 in 1912?

(2.) Why does the Secretary of State decline to give the names of the individuals to whom £10,000,000 of Indian money has been secretly lent in London? The money is public money and not the private property of the Secretary of State.

(3.) Why does the Secretary of State lend out India's millions without security in London at about two-and-a-half per cent. and at the same time

borrow back the money on behalf of the Government of India at three-and-a-half per cent ?

(4.) Why, when the Secretary of State's requirements in London according to his budget are only £16/17,000,000 per annum, does he withdraw from India £26/27,000,000 per annum ?

(5.) Why, when the Indian Currency Committee recommended that the Gold Reserve should be held *in gold*, does the Under-Secretary of State announce explicitly in a Parliamentary Paper printed for the information and instruction of Members of both Houses, that the Indian Currency Committee recommended that the reserve should be held *mainly in securities*.

To no single one of the above five questions did Mr. Montagu return a straight answer. Indeed, to questions (2), (3), and (5) he attempted no answer at all. In such circumstances the India Office must not feel surprised if the public attach the worst possible construction on the incident. With regard to Colonel Yate's first enquiry as to the reason of the steady increase *year by year during the last five years* of the cash balance (from £4,000,000 to £18,000,000) retained by the India Office in London, Mr. Montagu admitted that the balance of £18,300,000 *this year* was a matter for comment. It was, however, so he explained, 'only a part of the whole amount standing to the credit of the Government of India.' The reason of the magnitude of the figure was 'over-estimating and under-spending in certain departments and the great volume of trade done between England and India.' Mr. Montagu added (no doubt with reference to Colonel Yate's enquiry No. 4), that 'the Secretary of State had in view only one object—the facilitating of trade, *which would be brought practically to a standstill if Council Bills were not issued.*' A few minutes later, and whilst Sir John Rees was in the middle of his remarks, Mr. Montagu moved the closure!

What are we to say to replies such as these, solemnly put forward by a responsible official as answers to serious questions regarding the India Office's management of India's finances? The idea of informing Parliament, *as though the fact were some palliation of the scandal*, that the colossal cash balance (over £18,000,000) was 'ONLY A PART' of what the India Office held on account of the Government of India, would surely have occurred to nobody but Mr. Samuel Montagu. (The assertion is, of course, quite true. The India Office at present holds close upon £40,000,000 of India's money altogether, including Paper Currency and Gold Standard Reserves). Then again, "over-estimating and under-spending" to a degree that leaves the larger part of twenty millions sterling in the hands of the India Office is hardly a matter to be proud of. On the contrary it is the severest condemnation of the present Indian Office Budget makers that has yet been offered to the public. The climax of Mr. Montagu's efforts, however, is to be found in the last words of explanation that he put forth, namely, that the trade of India would be brought "practically to a standstill," unless the Secretary of State sold £26,000,000 of Council Drafts per annum (instead of the £16,000,000). For sheer ignorance of brazen impudence—no other alternatives are possible—this assertion certainly "takes the biscuit." Just fancy the High Commissioner for Canada (or Australia or South Africa) seriously informing the public that unless he transferred State funds, *of which he himself had no official need*, from Canada to London, at the bidding of certain private banks and others, *and at a lower cost to the banks than they themselves could ship the money*, the trade of Canada would be brought "practically to a standstill!"

One only needs to examine the suggestion for a single second to perceive the falseness and crass absurdity of Mr. Montagu's remark. The whole idea is too preposterous to merit a moment's discussion. At the same time, the fact that such rubbish should proceed from the mouth of an Under-Secretary of State for India in a solemn debate in Parliament on Indian affairs is a depressing sign of the times. It seems to indicate that poor India has little chance of fair play at the hands of some of the present financial "advisers" of the India Office.

The fact is that any effort to explain away the scandal only drives Mr. Samuel Montagu and the India Office deeper into the mire. *Qui s'excuse, s'accuse*, so a combined effort is now being made in Parliament and the London Press to hush up the whole matter by suppressing all references to the subject. The effect will fail. The public in India are at last understanding the bearings of the problem and are calling for justice and fairplay for India. The directions in which reform should now proceed may be summarised as under:—

(1.) Taxation in India which was, and is still, in excess of current requirements, should be at once lightened.

(2.) The present colossal cash surpluses (over £12,000,000 in India and over £18,000,000 in London) that have arisen from unduly heavy taxation, and from "over-estimating and under-spending," should be utilised forthwith *in India and for the benefit of India*, and not, as at present, in London mainly for the benefit of certain favoured Banks and Finance Houses who have little or nothing to do with India.

(3.) The India Office which, according to Mr. Hartley Withers, the City Editor of the *Times*, has in recent years become one of the greatest money-lending concerns in the world (*vide his "Meaning of Money"*), must at once cease this secret money-lending business with public money and must confine its financial activities to India's actual needs in London, and not to the bolstering up the businesses of London's Joint Stock Banks and other London financial enterprises.

There are, of course, other reforms that are essential before India's currency and finances can be restored to order and decency. These may be dealt with on another occasion. Enough has been written now, perhaps, to indicate that the gross mismanagement and scandalous misapplication of public money that has characterised the regime of the Finance Committee of the India Office in recent years, are not likely any longer to pass unchallenged, notwithstanding the efforts of Mr. Samuel Montagu, aided by the London Press, to conceal the mess from the public eye.—*Capital*.

Rubber planters in Burma are still in suspense as to what the Local Government propose to do about altering land tenure. Writes the Burma correspondent of *Capital* a few months ago the Lower Burma Planters' Association took united action in approaching Government on the subject. The present conditions of land tenure in Burma for rubber cultivation are eight years' free tenure, afterwards a rent per acre of any amount up to a maximum of Rs.25 per acre. That Association have suggested to the Government of Burma a scheme at the rate Rs.3 per annum and 2½ per cent. *ad valorem* duts. His Honour Sir Harvey Adamson would do well to give in to the Association and allow future leases on this basis and have the old leases altered to correspond. The rent *must* be fixed at a definite rate and done so quickly. Surely two years is a sufficient period for the Local Government to decide whether the rules should not be altered. The fear that a land revenue of Rs.25 per acre may be imposed is exercising a most detrimental effect on the extension of the rubber industry in this Province by frightening away capital from the country.

TEA.

Labour.

"On the estates of the Federated Malay States—chiefly, of course, rubber—there are employed 95,000 natives of India; 40,000 Chinese; 23,000 Malays, of whom half are Javanese. Sir William Taylor, who has taken keen interest in the immigration of natives of India and to whom the success of the organisation of it is largely due, has kindly described it for me as follows:

Systematic recruiting in India of labour for the Federated Malay States is permitted by the Government of India in the Presidency of Madras only. To facilitate the introduction of this labour a weekly service each way, in large and well-found steamers specially adapted for the purpose, is maintained by the British India Steam Navigation Company under contract with, and subsidised by the Government. Depôts are kept up at Madras and Negapatam for the accommodation of labourers waiting to embark for the Malay Peninsula, a European Superintendent with a sufficient staff being in charge at each place. Native agents are stationed in all districts of the Madras Presidency to assist in recruiting labour.

"Depôts are maintained at Penang and Port Swettenham, the ports of disembarkation for the accommodation of labourers on arrival and before proceeding to estates. An Indian Immigration Department, with headquarters at Penang, looks after immigration and controls arrangements both in India and the Malay Peninsula. The cost of the passage of labourers from South India to the Malay Peninsula is defrayed from a Fund known as the Immigration Fund into which the proceeds of an assessment levied on all employers of Tamil labour is paid. This assessment is paid by Government departments as well as by private employers, and is calculated upon the number of days' work done for each employer by his Tamil labourers. Employers desiring to increase their labour force by recruiting from India obtain from the Immigration Department licences for some of the most capable of their Tamil labourers whom they send over to Southern India. The licences provide that the labourers recruited thereunder shall be introduced into the Federated Malay States free of debt and that the cost of their bringing over shall not be charged against them. An estate on which the health is good and the management popular can obtain in this way large numbers of labourers at a cheap rate. It should be noted that no Indian labourers are now recruited under indenture, and all are at liberty at any time to leave their employment on a month's notice.

"Estates on which Indian labour is employed are visited at frequent intervals by the officers of the Immigration Department with a view to seeing that the provisions of "Indian Immigration Enactment" for the preservation of the health and welfare of the labourers are being observed. It is the duty of these officers to see that the labourers are healthy and well cared for, that their house accommodation is sufficient and proper, that there is a sufficient supply of wholesome water, that the sanitary arrangements are sufficient and proper, that provision is made for the medical attendance of the sick, that a sufficient quantity of medicine of good quality is provided, and that suitable and sufficient hospital accommodation is available. The enactments dealing with the subject further provide that in the event of estates or localities where Indian labourers are employed being found unsuitable or unfit for their residence or employment the further employment of labourers in such places may be prohibited.

COFFEE.

Crops and Supply.

The information in this article has been largely compiled from the August number of *The Spice Mill*, to which interesting paper full acknowledgements are due.

The 1911-12 coffee crop amounted to nearly seventeen and a half million bags (17,453,000) of which Rio and Santos contributed about twelve and a half million bags. Of this crop a little over seventeen million bags were delivered by the beginning of last July and the world's visible supply of coffee on 1st August 1912 was eleven million bags (11,031,983), very little more than it was on a similar date last year (10,884,862).

The consumption of coffee in America, which claims to be the largest user of this commodity, is on the increase, and the price is correspondingly rising.

The above quoted authority states that the British Consul at Sao Paulo in Brazil reports as follows on the prospects of the coming crop. "Predictions have appeared lately in the foreign press to the effect that the Sao Paulo coffee crop for 1912-13 will be exceptionally large, and that, consequently, the market value of the commodity is bound to decline heavily. In this case the wish is assuredly father to the thought. There exist at the present time no data upon which to base a reliable calculation as to the size of the coming coffee crop in this State. One important fact, however, must be borne in mind in this connection, namely, that during the month of August last year the coffee districts throughout the State were subjected to the very unusual experience of a spell of sharp frost. It is the opinion of experienced planters at Sao Paulo that the result of such visitation is to diminish, in marked degree, the productive power of the coffee shrubs not only during the season immediately following upon the frost but during the next following season also. The general opinion held in Sao Paulo is that the coming crop will not greatly exceed nine million bags."

In Java the Government Coffee crop has been estimated for this year at 7,344,000 pounds, the crop for several proceeding years having been four to four and a half million pounds. In Columbia a prolonged dry season, and a plague of locusts, render it probable that the coming coffee crop will be considerably reduced. In Nicaragua there are said to be about 70,000 acres of coffee, holding twenty-eight million trees, five million of which are young and not yet in bearing. Good prospects obtained this year, but heavy rain on the open blossom did a great deal of damage, and the crop is estimated at about half the usual amount.

All this tends to show that prices are likely to rule high this year, and the market to be a good one.

The following telegrams dated 10th September appeared the other day for the Indian Papers :—

"A message to the *Times* from Rio de Janeiro states that frost has severely damaged flowering coffee in many districts. It is yet too early to judge of the effects on the growing crop, but high prices are practically certain.

R. D. A.

FUNGUS NOTES.

Gummosis of Prunus and Citrus.

An interesting paper by O. Butler was published a short time ago in the *Annals of Botany*, Vol. XXV, No. XCVII, p. 107, under the title: 'A Study on Gummosis of Prunus and Citrus, with observations on Squamosis and Exanthema of the Citrus.' It is proposed in this article to give some account of the results arrived at in Butler's paper so far as gummosis is concerned, and to leave the consideration of that part dealing with squamosis and exanthema for a subsequent article.

Distribution and History.—Gummosis of Prunus and Citrus occurs in France, Germany, Great Britain, Italy, Portugal, Spain and America, as well as in Sicily, the Azores, and in India. The disease has never assumed serious proportions on Prunus but has been responsible for a large amount of damage in the case of Citrus. In St. Michael, in the Azores, it first appeared in 1834, and was at its height in 1840, when it caused the destruction of a large proportion of the citrus trees of the island. By the year 1873 it was no longer feared, though it still occurred. It subsequently made its appearance in Portugal, Sicily, Spain Corsica and Algeria. It seriously affected the groves of New South Wales between 1860 and 1870, and appeared in California in 1875, in Florida in 1876.

Description.—The first external signs of the disease are the occurrence of raised places on the epidermis or of drops of gum on its surface. As the disease progresses, the swollen spots on the epidermis burst and allow the gum to flow out, while in those cases where the first sign was the occurrence of small drops on the surface, the progress of the disease simply increases the flow of gum. At the stage when gum has appeared on the surface of the bark, the inner bark, or cortex, will be found to be permeated to a greater or less extent. The infiltrated bark subsequently dies, cracks, curls and sloughs off. Severe cases of gummosis are always accompanied by chlorosis, that is the disappearance of the green colouring matter of the plant, whose green parts become yellow; this probably results from a decrease in the absorption of mineral nutriment by the roots, brought about by the partial destruction of the bark which entails a partial starvation of the roots as regards the food-supply from the leaves. On cutting a slightly affected branch, two or more years old, through a diseased area, it will be found that the damage first arises in the young wood which has just been formed by the cambium. The diseased area is fusoid in form from the greater development of the diseased tissues near the point of gum accumulation and their lesser and lesser development as one proceeds further away. The gum exudes *en masse* from the centre of the sickle, but as one proceeds towards its extremities it will appear in droplets of decreasing magnitude and separated with larger intervening spaces of apparently healthy tissue. The gum in the centre of the sickle is more or less tinted yellow, depending on its age, whereas that pearling from the tissues at its extremities is always colourless.

"If sections are now cut at various distances above or below the centre of disease, it will be found that gum formation proceeds downward to a much less extent than upward. Further-more, if we imagine a line drawn through the middle of the pathognomic tissues, it will be found, as one proceeds upwards and downwards, that the gumming sickle diminishes in size."

Gumming may attack the stems, small branches, leaves or fruit, and may affect the tree locally or generally, according to external circumstances

and the species attacked. It may arise autogeneously, that is to say, without direct outside cause, or may be induced by the attacks of insects or fungi, or by any other form of damage such as may result from wounds caused accidentally by instruments or brought about by frost, sunburn, or the application of acids and poisons.

As has been stated already, the gum pockets may be formed among the embryonic cells of the xylem (the cells of the wood that have been formed most recently from the cambium). The cell walls of this tissue swell up and give rise to the gum. This breaking down of the cell wall may proceed until all its layers are disorganized, when the cell contents become mixed with the gum; or it may be arrested when only the two outer layers of the walls of certain of the cells have broken down, so that freed cells contained by the third layer are left floating in the gum. In mild cases this disorganization is confined to the embryonic xylem cells, but in more serious attacks it may extend to the cambium, the medullary rays, and the older cells of the xylem. When gummosis is arrested, the young xylem cells become lignified (provided with woody walls), and the cambium proceeds to lay down normal tissue so that the gum pockets are enclosed in healthy wood.

Cause.—For an outbreak of the disease the simultaneous occurrence of two factors is necessary, namely, active growth and a free supply of moisture. Butler believes that the formation of gum is due to the hydrolysis of the cell walls of the young xylem. Exactly how this is brought about is uncertain, but he is inclined to think that it is not due to the action of an enzyme. He puts forward good reasons for believing that gumming is not produced by the oxidation of the cell walls, nor by the direct action of a cellulose-dissolving enzyme: two theories which have been suggested by previous writers.

It will be seen from this that gumming is likely to occur when trees are grown in heavy, badly drained soils, or in suitable soils underlaid by an impermeable subsoil. Furthermore, it may be encouraged by excessive irrigation, or by high fertility of the soil combined with want of drainage or excessive irrigation; or by the too great application of manures, especially of nitrogenous manures; and, lastly, by continuous wet weather at the commencement of the growing period. These factors may either induce the disease or encourage its development on wounded trees or on those attacked by insects or fungi.

Preventive and Remedial Measures.—When the disease is traceable to wounds, or to the action of insects or fungi, preventive and remedial measures must deal with these agencies, and need not be discussed at length here. Preventive measures in the case of autogenous outbreaks of the disease should aim at attention to drainage, irrigation, manuring. The use of resistant stocks and of high budding also possesses a preventive effect. The maximum resistance is exhibited by *Citrus trifoliata* and *C. amara*, the bitter orange. The rough lemon, shaddock, orange and citron exhibit intermediate resistance in the order given; while the lemon is highly susceptible. Applications of salt at the rate of from 2 lbs. to 3 lbs. per tree are suggested as being likely to prove of value in preventing gumming. Certain other minor preventive measures are also mentioned.

The most important remedial measure is attention to drainage. Slitting of the bark, crosswise, longitudinally, or spirally, gives some alleviation when trees are subject to gummosis irregularly or accidentally. The excision of all tissues affected, both bark and wood infiltrated the gum, cannot be recommended; excision should be confined to the dead bark only.

Exanthema and Squamosis of Citrus.

The following article contains in a condensed form the information given by O. Butler on these two diseases in his paper in *The Annals of Botany*, Vol. XXV, p. 107. It may be looked upon as a continuation of the article on Gummosis.

Symptoms of Exanthema.—This disease is at present only known in the United States, where it affects all varieties of citrus of all ages that are growing on dry permeable soils or on light soils overlying an impermeable subsoil. The parts characteristically affected are the small branches, shoots, and occasionally the fruits. Frequently, the definite symptoms are preceded by a luxuriant growth and dark colour of the foliage, and by the presence of thick-skinned fruit. Then the shoots become more or less stained beneath the epidermis by a yellowish-brown substance, and begin to die back. If this symptom is not observed, another conclusive indication is that the fruit becomes stained and its epidermis is so hardened that it cracks and splits on account of the pressure of the growing pulp cells. In more advanced stages of the disease the young shoots swell at the nodes—occasionally also at the internodes as the shoots grow older; in some cases the pustules may alternate with nodal swellings. On the older branches nodal swellings are not produced, but the pustules may become very numerous and a small amount of gum may be observed in them. Gum may also exude through the bark in small amounts. When swellings and pustules are not formed on the shoots and branches, an excessive number of buds may be produced which may develop into short branches with yellow foliage; so that a witches' broom effect is brought about.

Cross sections of the diseased shoots show that the swellings are due to an accumulation of gum formed from the young xylem cells, as in gummosis; that the pustules are caused by excessive growth of the cortical tissues accompanied by a sickle-shaped patch of young xylem containing gum pockets; and that the rings of growth are well marked and are too numerous to be considered as variations in growth due to seasonal changes. The malady is very similar to gummosis, and is only differentiated from it by the occurrence of the erumpent pustules. These are possibly caused by the circumstances that the epidermis first becomes inelastic and checks normal growth and then bursts; after this vigorous or excessive growth recommences.

Cause of Exanthema.—This disease is so similar in most respects to gummosis that its occurrence is in all probability dependent on the same conditions, namely vigorous growth coinciding with an abundant supply of moisture. At the same time the abnormally large number of rings of growth indicates clearly that there has been a fairly rapid alternation of favourable and unfavourable conditions for development. This might be brought about by a quick alternation of climatic conditions, or by frequently recurring changes in the available supply of water. The last is clearly the cause in this case. The light soils on which plants with the disease are found become readily saturated with water, which they as readily lose.

It has been discovered that excessive applications of organic nitrogenous manures increase the severity of exanthema in Florida; while inorganic manures have a less marked effect. Butler suggests that this is due to the

fact that nitrogenous manures stimulate growth, and that organic manures in which the nitrogen is only rendered available by the process of nitrification are only so altered when the soil is sufficiently damp. Thus the growth stimulus due to the nitrogen takes effect at the very time when an ample supply of water is available and when the presence of that water has already induced a vigorous growth in the trees.

Cultivation is another factor that increases the susceptibility of citrus to the disease. Swingle and Webber suggest that this is because the surface roots are destroyed and the remainder are forced to grow down into an unsuitable subsoil. Butler believes, however, that this is not the true explanation, but that cultivation increases nitrification, particularly in humid climates, while it prevents excessive evaporation from the soil.

Remedial Measures.—The object to be aimed at in preventing or remedying the disease is to produce a uniformity in the water and in the nitrogen-supply, which will give rise to regular, and not to fluctuating, growth. Thus drainage, especially on soil overlying an impermeable layer, is a matter of importance, as is the correct regulation of irrigation water where irrigation is necessary. Care should be taken to increase the humus content of light soils, and applications of nitrogenous manures should be carefully regulated. Heavy fertilisation with phosphatic and potassic manures is also frequently found to be useful, as these have a restraining influence on growth. It may also be desirable to discontinue excessive cultivation, especially in soils underlain by an impermeable subsoil; and merely to apply mulches of different kinds to the soil, according to the material available.

Symptoms of Squamosis.—This is at present limited in distribution to Florida and Southern California, and is a disease confined to the orange tree. The conditions which favour its occurrence are prevalent only infrequently, so that the disease is rare; moreover it develops extremely slowly on affected trees. The chief characteristic is a sealing of the bark which may occur on the limbs or on the trunk, where it first appears as a single scale or group of scales. When the attack commences on the trunk or main limbs, the leaves do not turn yellow until much later and the tree may live for fifteen or twenty years. In fact in these instances, an attack is often hard to identify, as scaling of the bark may arise from other causes, while there are no indications of disease in the foliage and there is no definite correlation with environmental conditions.

Squamosis commences as a rounded or an irregular sloughing of the bark about an inch or somewhat less in diameter. The detached bark soon dies and curls more or less. This curling reveals the underlying cortical tissues which are warty, white, or white with a yellow tinge, and somewhat mealy. When a piece of bark falls, a pustule will be found beneath it; this pustule has a depression in the middle, from which gum frequently oozes. In some cases the pustular out-growth becomes less prominent, especially in advanced cases, and is replaced by a general swelling of the cortex lying below the epidermis. This causes the bark to flake off in large strips. On shoots and water sprouts, shield-shaped, raised spots are formed which are discoloured beneath the epidermis. These become hard, and the epidermis ruptures round their margins. In more serious attacks the spots are larger and less definite in outline. Cracks parallel to the axis of the shoot occur in them, and the disease producing tissues form distinct swellings on the shoots.—*Agricultural News.*

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Scientific Officer's Papers.

CIX.—PREVENTION OF THE INTRODUCTION OF INSECT PESTS AND FUNGOID DISEASES OF PLANTS.

Some of the most destructive pests and diseases known in Agriculture are those which have been transported from their native locality to other regions on, or with, their food plant. Insect pests are likely to be much more destructive when they are transported to new localities for several reasons. In their native environment they are very often controlled by natural enemies, but in the new locality these natural enemies may be absent, while climatic and other conditions may also suit them better.

The danger of the introduction into India of insect pests through the importation of plants for foreign countries is a very serious one, and becomes more serious each year as the communication and trade with other portions of the world becomes larger, and more rapid.

Lefroy states that of the destructive species of Scale Insects in India two-thirds have been introduced. The Green Bug (*Lecanium viride*) which has done so much harm to the coffee in the Nilgiris, and elsewhere, was originally imported from Ceylon. The danger of importing a destructive scale insect on Tea is considerable; no rubber plants should be imported into India without due precautions.

Any scheme for controlling insect and fungoid pests in India must be considered under three heads. First the prevention of the introduction of new diseases from any place outside the country. Second to control the spreading of pests which have already been introduced, but which are confined to certain localities, by preventing their introduction into new localities in the country. Thirdly to deal with the existing pests in those localities where they exist.

The subject of preventing, or at least controlling the introduction of pests and diseases by the importation of plants is one which has been grappled with in most countries where agricultural industries are large and important. In the United States nursery-men are prohibited from sending out plants on which insect pests are present, and a process of fumigation is adopted as a matter of ordinary daily routine. The United States, the West Indies, Cape Colony, Australia, Ceylon, and many European countries, have introduced legislation to protect themselves against the importation of plant diseases.

These countries have adopted legislation which in the first place regulates the importation of plants, secondly treats all imported plants on arrival at the ports of entry, and lastly provides for quarantine and inspection of plants after their arrival if necessary.

Fungoid diseases need different treatment to insect pests and are harder to deal with, as often the fungus cannot be destroyed by any treatment. Therefore plants and plant material on which any serious fungus disease is present should not be admitted into any country where that disease does not exist, and such plants should be destroyed at the port of entry. Again, plants coming from a country or locality in which they are subject to any serious fungoid disease should not be admitted into any country where that disease does not exist. A good example of an instance where such a precaution should be adopted is the case of the witch broom disease of Cacao in Surinam, a fungoid disease somewhat similar to the Sandalwood disease in this country. No Cacao—growing country should import cacao plants from Surinam for fear of introducing this disease, and in fact most Cacao—growing countries prohibit by law such importation.

In the case of fungi which are not so serious in their effects it is not necessary to prohibit importation, but merely to free the imported plants from spores and mycelium actually on them. For this purpose they should be treated on arrival at the port of entry with Bordeaux Mixture, Corrosive Sublimate, or some other suitable fungicide, before they are delivered to the importer. This is the process adopted in many countries with imported sugarcane plants, pine-apple suckers, cotton seed for planting, and so on, and it is the process which should be adopted with Tea seed imported into this country, or from one district to another in the country.

Insect pests are more easily killed and their importation more easily controlled. Scale Insects should be especially guarded against. To prevent the importation of insect pests a process of fumigation of imported plants on their arrival at the port of entry with hydrocyanic gas is now adopted in most agricultural countries.

The first law dealing with the subject in the West Indies was made in Jamaica in 1884; this was amended in 1891, and under these laws all plants introduced into Jamaica are now fumigated. In 1890 Trinidad followed suit with a law prohibiting the importation of diseased sugarcanes and the scope of the law was widened in 1894. During the years 1895 to 1908 all the other West Indian Islands passed laws making it possible to prohibit the importation of plants from certain places, and since 1908 laws have been passed in all these Colonies making provision for the introduction of plants under conditions which, as far as possible, reduce the risk of introducing new pests and diseases. As mentioned above many European countries, the United States, and most of the British Colonies now have similar legislation, and the matter is at present under consideration for India. (See *Planters' Chronicle*, Vol. V., p. 504).

The legislation adopted in the West Indies at the advice of the Imperial Department of Agriculture makes provisions under the following heads. First total prohibition; second destruction of badly infested plants on arrival; third, treatment of plants on arrival to kill pests or diseases which may be known or suspected to be on them; and fourth, inspection of suspected plants from time to time for a certain period with power to destroy such plants if they are found within that time to be affected with any serious pest or disease.

The law adopted by Grenada is a good example of such legislation. Under this law the Governor can by proclamation prohibit, or restrict, the importation of any particular seeds or plants from any particular country or place if necessary. Cacao plants from Surinam were prohibited on account of the witch broom disease for instance. In Cape Colony and Natal the Importation of coffee plants from India and Ceylon was at one time, and probably is now, prohibited on account of leaf disease.

The Governor in the same way has power to proclaim that any, or all, imported seeds and plants shall be subjected to a process of disinfection at the port of entry. This proclamation was made and all imported plants are disinfected at the Government expense by the Agricultural Officer in charge of the Botanic Station at Grenada.

This Agricultural Officer, who is usually a Botanist, Entomologist, or Mycologist, and in any case an important European officer of the Agricultural Department, has power to destroy a consignment of plants if he considers it necessary. He also has power to inspect imported plants after they have been delivered to the importer. In practice the former power was seldom exerted, but it was a very necessary one in the case of certain fungoid diseases; the latter power was useful in some cases to insure that a batch of diseased plants had been freed, from scales for instance, by fumigation.

The Agricultural Officer also had powers of discretion given to him, and was allowed to pass certain consignments of plants and seeds without disinfection if he considered that it was safe to do so. For instance garden and vegetable seeds imported from well known Firms, and packed in air tight cases, or sealed packages, were not disinfected.

In practice this law worked well and smoothly, and fumigation was found to be cheap, easy, and effective. In a small island like Grenada with few ports it was naturally much easier to work such laws than it would be in a country like India, with an immense sea board and numbers of Native States. Still, even in India, the difficulties are probably not insuperable, and the danger run by indiscriminate importation of plants is enormous.

(To be continued.)

RUDOLPH D. ANSTEAD,

Planting Expert.

Nitrolim.

In a recent issue of *Nature*, the following table of percentage of Nitrogen and approximate comparative prices was given :—

	Content of Nitrogen.	Price per ton.
Sulphate of Ammonia from gasworks	19.75%	£.13 0 0
Nitrate of Soda from Chili	15.5 %	9 15 0
Nitrate of Lime made by electricity	12.75%	8 10 0
Calcium Cyanamide made by electricity	18.00%	10 0 0

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Lime in Mysore Soils.—On page 487 of the present volume something was said about the Lime content of the soil in the Bababudin District. Mr. Oliver has called attention to a mistake, the soil in which the Lime content was estimated came from Hospet Estate and not Santaveri Estate. Hospet Estate is not on the Bababudins proper, but is situated on a flat some distance from the slopes of these hills, and its soil is dissimilar to the Bababudin soils. Apologies are tendered for making this mistake. The Lime content of the Bababudin soils is still open to doubt it would appear.

Phosphatic Fertilisers.—Referring to what was said in these columns about Bernard's Phosphate (p. 497) Messrs. T. Stanes & Co., write calling attention to their "Flour Phosphate." This fertiliser was described in the *Planters' Chronicle*. Vol. V, p. 81. It is prepared from the phosphatic nodules obtained in the neighbourhood of Trichinopoly. These nodules are ground very fine by special machinery so that the resulting product is at least 95 fine. The Phosphoric Acid in it is in an insoluble form and only slowly becomes available so that like Bernard's Phosphate it is a slow acting fertiliser. Messrs. Stanes & Co., say in their letter that an analysis they had made a few days ago of Flour Phosphate showed it to contain 25.42% of total Phosphoric Acid. The price is Rs. 45 per ton, so that the price works out at one anna and 3.2 pies per pound of Phosphoric Acid which, as they point out, compares very favourably with the lowest prices of Phosphatic fertilisers.

Fuel Trees for Tea Estates.—This subject was raised by the Delegate for Wynaad at the Annual Meeting of the U. P. A. S. I. and the notes on certain suitable trees given below were handed over to this Department with the request that they might be published in the *Chronicle* in the hope that some expressions of opinion on the subject would be elicited from Tea planters who had any experience of growing fuel.

"*Wattle.*—One of the various Australian and Tasmanian Acacias valued to some extent for their wood and their bark which is rich in tanning: for *tanbark* the most important species are *Acacia decurrens*, or (if it is distinct from this as appears to be the case) *A. mollissima* the common black wattle, also called green or feathered wattle and *A. pycnantha*, the broad-leaved or goldenwattle. The silver wattle *A. dealbata*, closely allied to the black wattle, is distinguished by the ashen colour of its young foliage and is a taller tree of moister and ground. Its bark is inferior but is considerably used for lighter leathers.

"Other species yielding *tanbark* are *A. Saligna* (*A. leiophylla*) the blackwood or lightwood, *A. melanoxylon*, the native bickory (*A. subporosa*) *A. penninervi*, etc. Several wattles yield a gum resembling Gum Arabic somewhat exported for use in cotton printing as an adhesive etc. the principle sources of this produce are the black wattle, the broad-leaved wattle and *A. homolophylla*.

"As regards practical results, I found the *A. decurrens* and the *A. melanoxylon* the best, but great care should be exercised regards planting of same; if to be used for fuel I should suggest it being planted along a roadside, 20 yards either side—but entirely by itself as it spreads itself quickly by running roots—so as to facilitate transport, but if this cannot be done, then in swamps *not too wet* or steep hillsides, where landslips are likely to occur: but it should in all cases be planted apart from any other trees or bushes. Seed can be had very cheaply from the Manager of Yellapatty Estate, Ellapatti P.O., Travancore, S. India.

" Another good fuel tree and one which I found the best for the purpose in the High Range is the Eucalyptus or " Gum Tree." I found the Red Gum the best, but the Blue Gum or *C. globulus* has been extensively planted in low lying Districts and both it and the Red Gum are recommended for planting in malarious districts for the purpose of counteracting miasmatic influences. From the extreme hardness or the fibrous character of the bark, some are known as " Iron-bark," or " stringy bark trees " and others are distinguished as Mountain-ash : " Box " or Mahogany trees etc."

This subject has been under discussion before, and upon referring to the Forest Department they recommended *Cullenia excelsa* (Tamil, *Malai Konji* or *Vellepa*) and *Calophyllum inophyllum* (Tamil, *Ponnay*) as being suitable trees to cultivate for fuel. A description of these trees was published in the Sc. O. Note. 106 (Vol. VI., p. 206.) A planter also recommended *Melia dubia*, the Giant Neem, as a good fuel tree (Sc. O. Note III. Vol. VI. p. 298.) Various species of *Eucalyptus* are also worthy of trial and a list of the varieties available at the Lal Bagh Gardens, Bangalore, was given in the *Chronicle*, (Sc. O. Note. 130 Vol. VI., p. 565) while an article on the subject appeared as Sc. O. Paper No. 62 (Vol. VI., p. 235.) Recently seed of several species of *Casurina* were obtained from the Lal Bagh for a planter who is experimenting with fuel trees. This completes the references to the subject in the *Chronicle* and it is hoped that any planters who have experience of these or other trees as fuel will publish notes on them.

Nitrolim for Coffee.—At the Annual Meeting of the U.P.A.S.I. an interesting discussion took place about Nitrolim and its effects upon Coffee. Although no definite figures were produced there appeared to be a general agreement that this fertiliser does have a good effect upon the coffee, and it was evident that a great deal of interest was being taken in its use. The mixture recommended at the Annual Meeting in 1910 has produced some excellent results on some soils in Coorg. This does not mean that the mixture is suitable for all soils and climates but as it has given good results in some cases perhaps it is worth a more extended trial.

The mixture recommended was 5 parts of Basic Slag, 3 parts Sulphate of Potash, and 4 parts of Nitrolim. This will give a fertiliser containing about 7.5% available Phosphoric Acid, 11% of Potash, and 6% of Nitrogen. It should be applied at the rate of about six cwts. per acre in February or March. It is by no means certain that this is the best time to apply such a mixture, and work is now being undertaken to try and discover the best time to apply different fertilisers to Coffee. Till more knowledge on the subject is forthcoming it would appear best, however, to apply such a mixture as this in the dry weather before the monsoon and blossom showers. When Nitrolim is applied by itself it should be put out at the rate of two cwts. per acre, broadcasted and lightly worked into the top soil. Complaints are often made that it is difficult stuff to apply and that it burns the hands of the coolies. It should be first mixed with about nine times its bulk of dry soil. This renders it much more easy of application. The following references to this fertiliser and its application in the *Planters' Chronicle* may prove of use to those particularly interested on the subject :—Vol. V. pp. 366, 385. Vol. VI. pp. 90, 632, 704. Vol. VII. p. 188.

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of a Meeting held at Meppadi Club, on Sept. 11th 1912.

PRESENT.—Messrs. Egán, Macleod, G. C. Parker, Powell, Stewart Vernede and C. E. Abbott (Honorary Secretary).

Mr. Stewart in the Chair.

1789. *Proceedings of last Meeting* were confirmed.

1790. *Denudation of Tambracherry Ghaut*.—Read letter from Mr. Foulkes, District Forest Officer, North Malabar, with reference to para. 1779. The Meeting resolved to thank Mr. Foulkes for his very interesting letter. Members are requested to send any information to the Honorary Secretary.

1791. *Sale of Westward Ho Bungalow*.—The Honorary Secretary informed the Meeting that the purchase money for this Rs.2,500 had been credited to the account of the Association.

1792. *Grant to Vayitri Club*.—Proposed that the sum of Rs.500 be paid from the funds of the Association to the Vayitri Club Committee for the purpose of building two bedrooms, and generally improving the Club. —Carried unanimously.

1793. *Stray Dogs in Bazaars*.—Mr. Stewart informed the Meeting that the Taluq Board had decided to enforce the proposed regulation (See para. 1787).

1794. *Schools on Estates*.—Mr. Stewart also informed the Meeting that grants may be obtained up to Rs.100 for putting up a building and a certain monthly amount depending on attendance through the Government Inspector of Schools, Calicut. For sums over Rs.100 application has to be made to the Educational Board, Madras. Mr. Stewart was thanked for the information he had obtained.

1795. *U. P. A. S. I. Meeting, 1912*.—Read a letter from Mr. Nicolls giving his report on the Proceedings:—

“I much regret being unable to attend the meeting of your Association to-morrow.

“I am afraid, except as a name, my representation as delegate from the Wynaad was a very poor one, and it is to be much regretted that Mr. Waddington was unable to be present. As the majority of those attending this year were making their first appearance as delegates at a U. P. A. S. I. Meeting, you will all no doubt miss those interesting speeches which have been made by delegates at past meetings—men who have got over the first stage of shyness and so learnt the way of speaking. A considerable amount of discussion on various subjects took place in Committee, most of which will never be printed. The Chairman treated us with a lenient hand, and I am certain he himself was pleased to see so much new blood present.

“It is unnecessary for me to remark on subjects at any length. Mr. Abbott will be much better able to explain any knotty points to you than I can.

“The Secretary's report was, as could only be expected, a very brief summary of the work done during the year.

"The Chairman's opening speech, I am certain, you will all agree, was tactful and to the point.

"The member of the Legislative Council The Hon'ble Mr. J. G. Hamilton was unfortunately unable to be present.

"*Finance*.—This is a matter Mr. Abbott will tell you all about.

"*Weights and Measures*.—An ever recurring part of the Agenda was ably dealt with by Mr. Hughes, a former member of your Association.

"*Roads and Railways*.—I did not vote for your Association as regards Mr. Hughes' resolution, but I feel certain that you all must hope that those millions Mr. Hughes and his seconder have set their eyes upon may be spent on Raiiway extension in India, and that South India may receive some share.

"*Cattle trespass*.—After considerable discussion in Committee I put a resolution before the meeting which was eventually carried. The opinion of those members objecting were, that no legislation was wanted, and that the present Act was sufficient. Delegates were given a brief summary of Mr. Stewart's case, but it was impossible to pass a resolution on same.

"*The Indian Tea Cess*.—A resolution was put by the Chair that the cess be renewed for another five years and was carried unanimously. Mr. Jackson spoke very much to the point. There is no doubt that the Fund has done good work and may be expected to continue doing so. We have been assured by prominent promoters of our industry that years of plenty lie before us. If so we shall not feel the small amount we contribute out of our prosperity.

"*Enticement of Labour*.—This is a matter which you have had much before you of late. There is little doubt that there is a growing opinion amongst some Associations that labour matters are not receiving sufficient attention. I may say without ample labour it is impossible to derive the full benefits from the Scientific Department. A scheme of registration was put before the Meeting and Mr. Abbott gave your views on the subject. A Sub-Committee was appointed to receive the opinions of the various Associations with a view to try and harmonize this into a workable scheme. I am afraid they have a hard task in front of them. All schemes can be improved on, but they must first be given a trial run. It may be impossible to present a scheme which would be unanimously adopted, but I feel certain that a start should be made. The Goodfellows were represented to us as wolves in sheep's clothing; they may have not intended to cover themselves in such unpleasant garb. There is little doubt that the circular issued by their agents in the Shevaroy's must have upset the labour in that district. It would not be felt at the present moment when probably all coolies are under contract, but it is certain to make itself felt when coolies return to their country and find a 'Zemindari' ready to further explain. The Goodfellows admitted themselves that 'From the Dorai in India to the Dorai in Ceylon' would in all probability be read by the cooly as we chose to read it. They admitted that thousands of their circulars had been issued and that any harm done could not be undone. Messrs. Carson & Co. were bound to do the best they could in their own defence, and they have done it well, ably backed up by the Ceylon papers. The Ceylon papers scorn the idea of 'crimping' by a Ceylon man. The island has improved since the day and only 'man is vile.' It may be so—we hope so.

"Ceylon recruiters have started agencies in the midst of districts where we have been recruiting our total requirements from for many years. A

census of the population in those districts of available people as 'estate labourers' would, I think, prove to the Ceylon recruiters, that probably every cooly recruited by them from those districts was in all probability an advanced cooly of some estate in S. India.

"Non-Service of Warrants.—I had instructions from your Association to represent the difficulties two members of your Association had in bringing accused to trial even after warrants had been served. I was unable to give full details and Mr. Abbott kindly informed the delegates. I hope these cases will not be allowed to drop.

"Trees suitable for fuel and timber.—Mr. Anstead promised to deal with this matter in the *Planters' Chronicle*.

"Election of Office Bearers.—I voted for the members who were elected on your behalf. I think the choice was a good one. The election of Mr. Abbott as Chairman was a very popular one, and I am certain the honour done to him and your Association will be much appreciated by you all."

Mr. Nicolls was thanked for his services and his letter was ordered to be published.

The Honorary Secretary also read his report.

"In giving some account of anything of special interest to this Association that happened at the Bangalore Meeting, I wish to thank one of our Members, Mr. Nicolls, who was present as a Nilgiri Delegate for a great deal of assistance. I hoped he would have been here to-day. Mr. Waddington whom you selected to represent you, was unfortunately unable to attend. I did all I could, but being in the Chair, it was sometimes rather difficult for me to represent your views as fully as I could have wished. So I am personally much obliged to Mr. Nicolls. We passed a resolution to ask the Government of Madras to take steps to prevent cattle straying along the public roads, though some Delegates thought that it would have been better to have worked the matter through the S. I. Motor Union. We also voted in favour of renewing the Tea Cess for another 5 years. The opinion of the Tea Planting Associations throughout India is the same as ours, but I see that the Madras Correspondent of the Calcutta financial paper *Capital* thinks we ought to have gone against it.

"There was some discussion in Committee about the non-execution of warrants, and 3 resolutions proposed by the Nilgiri Association were carried by a majority. I voted against them on behalf of Wynaad, as if given effect to, they would hamper the issue of 'hand warrants' which we are allowed to have in Wynaad. The difficulty is that these warrants are not allowed to be used in the Nilgiris, and the planters there want them to be allowed under certain restrictions.

"A very interesting discussion arose over the methods of the Ceylon Recruiters, and the action taken by Governments outside India towards supplying their local planters with coolies at the expense of the public.

"The first subject has perhaps been sufficiently ventilated. But planters in India must keep a look out for attempts made on Estates to get their coolies to leave them and emigrate. The European Recruiters deny all knowledge of such practices, but are unable to keep a proper check on their native Assistants: while a section of the Colombo Press commends such attempts as real smart work. The Colombo papers are also lavishing a great deal of abuse on the advertisement composed by Mr. Martin and

adopted by the U. P. A. S. I. designed to show the cooly that he can do better for himself by coming to work on plantations in India than by emigrating. The annoyance this advertisement has caused shows its value to us, and I hope that if the bad language continues, Mr. Martin will find time to rub in some of the statements.

"With reference to the second part of the discussion Mr. F. M. Hamilton informed us that the Zanzibar Government is importing coolies from Bombay to work its plantations. These coolies appear to get free passages and other inducements.

"Mr. Hughes drew attention to what the Straits Government are doing to help planters there. And the question of emigration to the F. M. Straits is the most important matter we have before us at present. There were 108,000 emigrants to Penang and other ports in 1911 from S. India, of these 80,000 were coolies for plantation work. Mr. Hughes informed us that the Straits Government pays all expenses for recruiting and travelling, and hands the coolies over to the planters free of debt. A correspondent to whom I am much indebted for all the trouble he has taken in the matter has sent me some further information on the subject which is not at present for publication. But I may say that Mr. Hughes was quite correct. The Straits planters do get their coolies handed over free of debt, with all expenses paid by Government, but they have to pay a poll-tax of 6 dollars a head yearly. They consider this too much, and would prefer to do the recruiting themselves, and be free of the poll-tax. One would think they must be hard up for something to grumble at, for there are few planters in India or Ceylon who do not pay more than Rs.10 per head for Maistry's commission, without mentioning the cost of recruiting and heavy losses in advances. Of course the conditions under which coolies can be employed in the Straits are onerous in the way of housing accommodation and medical attendance. But these conditions would exist in any case whether the coolies were recruited by Government or not. A Committee was appointed to suggest a scheme for improving the labour position, and the proposed scheme of registration is to be printed and circulated among District Associations with a view to coming to some definite conclusion before the next U. P. A. S. I. Meeting. I said that as far as Wynaad was concerned we were prepared to consider any registration scheme on its merits, provided, as a first step, Government agree to adopt it to prevent the emigration of advanced coolies and maistries, but otherwise not. I mentioned at a recent Meeting that Mr. Cammiade, our Divisional Officer, had suggested that we might induce coolies to take up land for paddy cultivation and so settle in the District: also that Government might perhaps grant the land on favourable terms, a plan which has been tried in Assam. I have seen it stated recently, that the system does not work well for the Assam planter, who finds that the cooly devotes all his time to his own work, and is never available for the estate. The plan has been tried here with Locals, with very much the same result: added to which they usually got hopelessly into debt.

"Several Associations have now agreed to subscribe to the U.P.A.S.I. on the 2 annas per acre basis, which we are already paying, on condition that the finances of the Central Association were put on a proper footing and fully enquired into. This has now been done."

The Meeting thanked Mr. Abbott for his report, and congratulated him on being elected Chairman. It was decided, as so much important matter was discussed in Committee this year, that copies of the Book of Proceedings be supplied to Members of this Association.

1796. *Taluq Board of Membership*.—Read letter from the President, Wynaad Taluq Board. It was decided to nominate Mr. H. B. Winterbotham for re-election.

1797. *Bad Grain in Bazaar*.—Read correspondence regarding Captain Willcock's report and letter from Mr. Cammiade. Mr. Gillatt and Mr. Darkin were thanked for the trouble they had taken in the matter.

1798. *Analysis of Fertilisers*.—Read letter from Mr. R. D. Anstead, Scientific Officer, forwarding a copy of the resolution passed at the U.P.A.S.I. Meeting, and asking to be informed what number of analyses Members of this Association are likely to require. Members are requested to inform the Honorary Secretary as soon as possible.

1799. *Post Office at Perrandotty*.—Mr. G. C. Parker called attention to the demand of the sum of Rs.264 by the Postmaster-General, Madras, for opening this Post Office; which sum is not to be returned, though the General Manager of the Panora Company has offered to provide free quarters for the Postmaster and his office, and to guarantee the Department against any loss for a year, in case of the Post Office not paying its way. Mr. Parker handed the correspondence to the Honorary Secretary. As the terms offered by the Panora Company have been considered sufficient in other cases of new Post Offices being established in planting districts it was resolved that the Postmaster-General be addressed on the subject.

1800. *Meppadi Club*.—Mr. Egan gave notice that at the next Meeting he would propose that a grant of Rs.1,000 be given to the Meppadi Club for the purpose of improving the building.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) J. C. STEWART,
Chairman.

(„) C. E. ABBOTT,
Hony. Secretary.

INDIAN LABOUR IN MALAYA.

According to figures submitted at the recent annual meeting of the Planters' Association of Malaya the number of arrivals of Indian labourers for 1911 showed a material increase as compared with the previous years. The following returns show the net increase as represented by the difference between the number of arrivals and that of departures:

INDIAN LABOURERS ENTERING AND LEAVING MALAYA.

	Arrivals.	Departures.	Net Increase.
1909.....	49,817	31,374	18,443
1910.....	83,723	39,080	44,643
1911.....	108,471	48,103	60,368

These figures are considered very satisfactory, and it is expected that those for 1912 will be equally good. The number of immigrants in January, 1912, was about 12 per cent. more than in January 1911.—*The India Rubber World*.

FORESTS AND RAINFALL

Sir W. Schlich, F.R.S., Professor of Forestry at Oxford, writing in the new edition of the "Encyclopædia Britannica," defines a forest as "an area which is for the most part set aside for the production of timber and other forest produce, or which is expected to exercise certain climatic effects, or to protect the locality against injurious influences." One of the most important of the climatic effects ascribed by some to forests is the increased amount of precipitation, not only in the forest areas themselves, but also in the country surrounding them, produced by the influence of the forests upon the moisture-laden air which passes over them.

Owing to the relatively small area of our forests and the rarity of serious floods or prolonged droughts, the question of the influence of forests upon rainfall has not received much attention in this country, but on the Continent,—in France, Germany, and Austria especially,—in America, and more recently, in India, the arguments for and against the existence of any influence have been put forward at great length, and sometimes with much energy.

The literature on the subject is somewhat bewildering, not only on account of its extent, but also because of the surprising divergence of views entertained by different authorities. Most European and some American writers are in favour of the accuracy of the supposed forest influence, while other American authorities maintain that the effect is entirely fictitious; that the instrumental records which have been adduced in support of it are affected by errors brought about by differences of exposure in the forest and in the open, and that, if there is a connection between forests and climate, it is the latter which controls the growth of the former, the former having no appreciable effect on the climate.

On one side the problem has been attacked by the historical method; that is, the state of a forest and the amount of rainfall in its vicinity are compared together over as long a period as possible. On account of the lack of trustworthy records of rainfall for the long periods required, the fall is usually estimated from accounts of the condition of some stream or river in the neighbourhood. As an example of this method may be cited the case of the river Loire, which in former times afforded communication by water between Nantes and the central provinces of France. In 1551 the Marquis of Northampton went from Orleans to Nantes, with his suite, in "five large, many-cabined boats," whereas navigation is now impossible above Saumur, the distance of which from Nantes is less than half that of Orleans. This change is ascribed to the deforestation carried on extensively in the surrounding country in the seventeenth century, and the consequent diminution in the volume of water in the Loire due to diminished rainfall. It is here tacitly assumed that the general climate over Western Europe has remained unaltered throughout the period, and that any change in the climatic conditions is due to local forest influence, secular changes of climate being entirely overlooked.

The strongest arguments in favour of the supposed influence are based upon observations at so-called "parallel" stations, *i.e.*, meteorological stations are established within a forest area and in the open country round the forest, respectively, and a long series of *simultaneous* observations are made at all the stations. In nearly all localities where such observations have been carried out, an appreciable difference exists between the rainfall measured inside the forest and that measured outside, the forest station having an excess of precipitation over the "parallel" station. A remarkable

example is that of Lintzel, in Hanover. In 1882 the rainfall at this station was considerably less than at most neighbouring stations. Young trees were planted round the station in 1877, and as they grew up the rainfall at Lintzel gradually increased in comparison with its neighbours, until in 1890 it was generally in excess where in 1882 it had been in defect. The objection urged against the historical method does not apply to this kind of reasoning, which appears conclusive on the face of it. In a series of recent papers in *Meteorologische Zeitschrift*, J. Schubert has shown that a forest station in West Prussia and Posen has from 2 to 10 per cent., and in Silesia from 2 to 6 per cent., more rainfall than a parallel station in the open country. From this it is argued, that inasmuch as a forest increases the rainfall over its own area, it may be expected to produce some effect of the same kind in the surrounding districts, because the wind would carry forward the rainbearing clouds formed by the forest influence.

The value of observations derived from parallel stations has, however, been strongly criticised by some American meteorologists. Prof. Cleveland Abbe has urged that the results are vitiated on account of the fact that a rain gauge exposed in a forest clearing is not subjected to winds as strong as those which pass over a gauge at a parallel station in the open country; and that, in consequence, the forest gauge may be expected to record more rain, although the real fall may be identical at the two places. As a result of his investigations, Abbe is of opinion that there is no appreciable difference in the rainfall outside and inside a forest. Schubert was aware of the force of this contention, and definite allowance was made for difference of exposure in the results quoted above. His margin is, however, so small, and the correction allowed on account of exposure differences is so uncertain, that his final result cannot be regarded as furnishing a conclusive solution of the problem.

In a report on the "Influence of Forests on Climate and on Floods," Prof. Willis L. Moore, Chief of the United States Weather Bureau, brings forward some considerations against the supposed effect of forests on rainfall. One piece of evidence shows how climate affects the extent of a forest area, and suggests that the influence, if any, is from climate to forest, and not conversely. Mr. E. Huntington, travelling in Chinese Turkestan, stated that "popular forests, which once extended for scores of miles, now form wastes of branchless dead trunks like gaunt grey skeletons, and beds of dead reeds cover hundreds of square miles. It has often been asserted that the destruction of forests has been the cause of the diminution of rainfall. In the Lop basin the opposite appears to be the case; the supply of water has diminished, and therefore the forests have died."

The physical explanation for the increased rainfall which is put forward, is that the evidence is undisputed that air temperature is less and percentage humidity is greater over a forest than over the neighbourhood. In favourable circumstances, condensation of water vapour may therefore be set up over a forest, and once the condensation has started, it may continue automatically, owing to the large amount of latent heat liberated in the process of condensation, which will tend to set up convection currents.

Prof. J. von Hann's opinion on the subject, in the latest edition of his "Handbuch der Klimatologie" is that the question cannot be definitely answered at present, but that the effect, if any, should be greater in the tropics than in higher latitudes. Dr. G. T. Walker, of the Meteorological Office, Simla, is of a similar opinion. He states that if forests have any influence at all on the rainfall, it is probably not greater in India than 5 per cent.—*Nature*.

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(INCORPORATED.)

A Scheme of Registration.

ENTICEMENT OF LABOUR.

The following Resolution was passed on the 15th August, 1912 :—

"That a scheme of registration read at this Meeting be printed and circulated among District Planters' Associations in order that the subject may be considered thoroughly with a view to coming to some definite conclusion at the next U. P. A. Meeting."

SCHEME OF REGISTERING BY FINGER PRINTS.

Explanation of Terms used.—R. O.—Registration Officer for finger prints ; imprints—the finger and thumb prints of both hands : register—the person who sends imprints for registration. R. P.—the person whose imprints are registered. W. B. E.—Would-be-emigrant.

The Objects of the Scheme.—(1) To stop the emigration of any R. P.

(N. B.—Anyone ceases to be an R. P. directly his or her agreement is finished, or advance paid up on expiry of an agreement, *i.e.*, when the R. P's. ticket is returned to the R. O., and the R. O's. imprints taken off the files.)

(2.) To enable registerers to catch any R. P. who taken an advance from any other registerer.

Re-Working of Scheme.—Finger prints would have to be taken off the digits of both hands on forms supplied by the R. O. The outfit required for taking finger prints are (a) a small sheet of glass (b) some printers' ink, and (c) a cylinder covered with rubber for spreading the ink on the glass. When the form is filled in, it would have to be sent to the R. O., who would return a ticket with the number of the R. P. on it.

II.—Should imprints be sent for registration which are already on the files, the original registerer and the would-be-registerer would both be advised by the R. O.

III.—Re-registration would not be necessary unless the R. P. changed his address.

N. B.—An R. P. could make a fresh agreement on the same estate, as in the event of his trying to get advances on some other registering estate, the Superintendent, (*i.e.*, the registerer) would be advised of his being re-registered elsewhere.

WORKING OF THE SCHEME.

Re-Emigration —Government would have to be asked :—

(a.) To see that every W. B. E. got a pass from the R. O. stating that he or she was not an R. P.

(N. B.—To get this pass, imprints of the W. B. E.'s digits would first have to be sent to the R. O. If the imprints showed the W. B. E. was an R. P., both the Emigration Department and the registerer would be advised by the R. O.)

(b.) To see that the W. B. E. was the person whose imprints had been sent to the R. O. for the pass.

(N. B.—For otherwise imprints belonging to some one known not to be an R. P. might be sent to the R. O. and a pass obtained by which an R. P. could emigrate.)

Advantages to Government.—(1.) That by stopping the emigration of people who still owed money in the country, Government would prevent fraud and stop heavy losses in advances to the planting community, native landholders, bazaar men, etc. Losses in advances mean lower dividends and consequently less capital being brought in or spent in the country, and less trade. Losses to bazaar men, etc., mean higher prices to compensate.

(2.) That Police would not be constantly sent to serve warrants, etc., on false rumours that the accused was in a certain place.

(3.) That the Police should be advised by registerers as to the whereabouts of the accused.

(4.) That the identification of accused would be simple, as any suspected man could have imprints of his digits taken and reference made to the R. O.

(5.) That the wrong person would not be arrested.

(6.) That R. P.'s would quickly realise that they would be caught at once if they tried to get advances in any registering estate, and would be more easily found in non-registering estates, and so would work out their contracts, and save Planters, Magistrates, Police, maistries and contractors much time and trouble over cases, warrants, etc.

Notes on the Scheme.—(1.) If the majority of estates joined, fraudulent coolies would soon realise that non-registering estates would be a safe place to get advances from before bolting or emigrating, which would tend to make non-registering estates register to protect themselves.

(2.) It is probable that honest maistries would prefer the security given to them by registering estates.

(3.) It will be unnecessary to register local labour.

(4.) Except re-emigration we do not require Government's help.

(5.) Non-registering estates would be happy hunting grounds for the Police who want R. P.'s.

(6.) If we can stop a certain amount of emigration we should I gather, have plenty of labour for all our needs and shall be able to stop increasing wages and advances.

Fees.—It is suggested.

I. That all registering estates should make a deposit with the R. O. to cover fees, as collecting fees, by V. P.'s especially small sums for advances, etc; defaulting R. P.'s. would entail much more work, to the R. O. than periodically submitting accounts.

II. That one fee covers registering and cancelling.

III. That registerers pay a fee for advices re-defaulting R. P.'s.

IV. That a scale of fees could be fixed when it is ascertained how many coolies are like'y to be registered, and consequently the cost of the office.

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of the Annual General Meeting of the S. P. A. held at the Victoria Rooms, Yercaud, on Thursday 19th September, 1912.

PRESENT.—Messrs. J. C. Cobbe, F. Carey, S. Campbell, S. M. Hight, W. W. Hight, A. B. Kundaswamy, W. I. Lechler, J. C. Large, E. Large, C. Rahm, W. Rahm, L. Rochet, P. J. A. Williams, and Chas. Dickins (Honorary Secretary and Chairman). *Visitors*: Messrs. N. Hight and I. Lechler.

The notice calling the Meeting was taken as read.

(1.) *Honorary Secretary's Report, Delegate's Report and Passing of Accounts*:

ANNUAL REPORT.

GENTLEMEN,

In offering you a few brief remarks in connection with the working of this Association from 1st September, 1911 to end of August, 1912, I would first mention that there are 36 members on the roll up to date representing 4,825 acres—as against 30 members representing 4,200 acres at the close of last season. One member joined us from 1st July. This increase of members and acreage is due to the Pulney's having joined us at the commencement of the year.

At a General Meeting held in February last a resolution was unanimously carried that the subscription of membership be raised from Rs.20 to Rs.30 per annum, to include all subscriptions, except P. B. F.—thereby enabling this Association to meet its share of the enhanced subscription to the U. P. A. S. I.

We now pay the U. P. A. S. I. a subscription of 2 annas per acre, which includes the Scientific Department.

It gives me great pleasure to report that Mr. J. P. Bedford, I. C. S. Collector and District Magistrate, Salem, has become an Honorary Member of our Association. Mr. Bedford displays a kindly interest in matters connected with the planting industry on these Hills and also in the improvement of Yercaud, and during the short time he has been in the District he has done much for us. The Association is to be congratulated on having him on its roll.

I feel I must refer to the loss the Planting Community on the Shevaroy has sustained through the death of Mr. Carl Rahm—the oldest Planter on these Hills, and also one of the founders of our Association.

The deceased, from the formation of the Association till he retired from active work, took a keen interest in its welfare and for years continuously served on the Committee. He was of a kind and charitable disposition and was much respected and loved by all with whom he came in contact.

With reference to Accounts now under the hands of your Auditors, I beg to state that the income of the Association amounts to Rs.1,435-2-10 plus Rs.15 still due which I have no doubt will be paid in shortly.

The Income is arrived at as follows:—

	<i>Rs.</i>	<i>a.</i>	<i>p.</i>
Balance brought forward from last year's account ...	137	5	10
34 members @ 30 Rs. each ...	1,020	0	0
Subscription from one member for 6 months ...	15	0	0
Part subscription from one member for 1912 ...	15	0	0
15 subscribers @ 10 Rs. each to P. B. F. ...	150	0	0
By sale of bamboo and grass permit ...	23	0	0
and			
	74	13	0
refunded from the International Rubber Exhibition, very kindly presented by Mr. Cayley—to the Association—bringing the grand total to ...	1,435	2	10

The expenditure is as follows:—

	<i>Rs.</i>	<i>a.</i>	<i>p.</i>
Subscription to U.P.A.S.I on 4,825 acres @ 2 as. ...	603	2	0
Subscription to Experimental Plot on Nilgiris ...	40	0	0
Payment to U. P. A. S. I. for printing 1,500 Tamil circulars ...	12	0	0
To the P. B. F. ...	150	0	0
Delegate's expenses to Bangalore for year 1911, and year 1912 ...	150	0	0
For printing 30 copies of Honorary Secretary's and Delegate's Report of 1911 ...	5	0	0
To Forest Department for bamboo and grass permit..	25	0	0
Postage and Wires ...	10	0	6
Office establishments ...	204	0	0

Total Rs... 1,199 2 6

And leaving a balance in hand up to end August of Rs.236-0-4 + Rs.15 still due and I have by me grass permits to the value of 2 Rs. Rs.236-0-4 I shall be glad to hand over to anybody you appoint as Honorary Secretary for the coming year.

I must take this opportunity to thank members for the prompt manner in which they have paid in their enhanced subscriptions this year, thus rendering the work of the Association a pleasure.

Owing to a less number of subjects coming up for discussion this year ; 3 General Meetings, 2 Committee Meetings, two Special General Meetings—were held—Two deputations were formed one to meet the Dy. Tahsildar and one to meet our worthy friends the Messrs. Goodfellow.

I desire to place on record the valuable services rendered in the past to this Association by Mr. C. G. Lechler. He made it a point to always attend our meetings—though latterly far from well, and displayed great energy, zeal and thought over subjects brought up for discussion. His departure from this country has left a blank in our Association, and I sincerely trust the time is not far distant when we shall have him in our midst again, with restored health and energy gained by his well earned holiday.

We have been modest in our demands this year and have only asked Government to open a cattle pound out on the Green Hills.

I have had official information from the Local Fund Engineer—that the link between the Head of the Salem Ghat Cart Road and the Varniah Cart Road is to be constructed, estimated to cost Rs.4,000 and the work will commence as soon as a capable local contractor comes forward. It is most

gratifying to report that Local prices of coffee of all grades last season, were the highest on record for many years, and I hope this happy state of affairs will continue. I trust members will see their way of giving attention to the circulation of coffee price Post Cards this season, as doubtless those who sell locally find the information advantageous

In conclusion the Committee and myself place their resignation in your hands and in tendering my resignation I would draw your attention to the fact that I have had the honour of representing your Association for nearly 4 years. The undertaking of the Secretaryship has been made pleasant by your co-operation, help and advice for which I heartily thank you. I consider this a fitting opportunity for you to elect a fresh Honorary Secretary from amongst your members, so before the close of the meeting I shall feel thankful if you will kindly elect office bearers and Honorary Secretary for the coming year.

DELEGATE'S REPORT.

Your delegate attended the Annual Meeting at Bangalore on 12th August and carried out your instructions to the best of his ability on those subjects which directly concern this Association. As full details of the meeting were published in the M. M. and *Planters' Chronicle*, it is unnecessary for me to take up your time by going over the different subjects, so a short summary is herewith subjoined for the information of members.

In connection with roads and communications this Association on behalf of the Pulneys put forward the following resolution with reference to the Ahtoor Ghat Road, which was carried.

AHTOOR GHAT ROAD.

"That the District Board of Madura be asked to hand over the Ahtoor Ghat Road to the estates on the Pulneys, that are interested in its repairs and upkeep, and to allot Rs.1,000 (minimum) per annum towards its maintenance, provided that the estates concerned guarantee to spend at least Rs.700, per annum over and above that sum for the next 5 years."

"Also that the Board be asked, should the estates' contributions exceed Rs.700, that the District Board allotment may be increased proportionately. And further that the District Board be informed, should the above proposals meet with the District Board's approval, that the contributing estates are prepared to supervise the work on the road and to submit such accounts as may be deemed necessary by the Board."—Carried.

Before I left for Bangalore I received a communication from Government with reference to a resolution we put before the U. P. A. S. I Meeting of 1911, on the subject of "bees and fertilization." In this letter Government inform us that the Government Botanist and Mr. Fletcher, the future Madras Entomologist state that it has not been proved that Bees are essential for the pollination of coffee, and so forth. Rather than let the subject wait for another year, I placed the following resolution before the U. P. A. S. I. which was carried,

"That the U. P. A. S. I. be asked to bear the subject of bees and fertilization in mind and that the Secretary be empowered to remind the Government of Madras to allow their Entomologist to investigate the matter some time before the coffee blossoms next year and offer them all the Assistance in their power."

The question of labour was discussed and occupied the attention of the meeting for a considerable length of time. You have all read Mr. Barber's Scheme of Registration which was published, and a resolution was carried to the effect that it be printed and circulated among District Associations in order that the subject may be considered thoroughly, with a view to coming

to some definite conclusion at the next U. P. A. S. I. Meeting. Also that a Sub-Committee be formed to receive the opinions of the various Associations before the next Annual General Meeting with the idea of improving the labour position—a resolution also to the effect that the names of all known recruiters for places outside India be printed in the *Planters' Chronicle*—was carried.

This has already been done in *P. C.* of 31st August, but I think as far as Salem is concerned the name is incorrect. Goodfellow said the recruiting Department at Salem was managed by a European. I don't think Sivalingum, supplier, is one, at least he was not when I knew him 3 years ago.

The publishing of Mr. Goodfellow's leaflet that had been circulated on these Hills some few months ago, caused considerable surprise, and the U. P. A. S. I. highly approved of our action in drawing general notice to this very important matter—however regrettable. The Ceylon Press appear to have taken a different view of the case judging by the vindictive articles that have appeared from time to time in the *M. M.* against us, and I consider our thanks are due to our worthy Chairman, Mr. Abbott, who has so ably defended us against those uncalled for attacks.

With reference to the adulteration of coffee I think it will interest all members to know that the following resolution was carried. "That Government be approached through the U. P. A. S. I. with a view of dealers in this country being restrained from selling coffee in tins, with a large percentage of cheap admixtures, under the name of "Pure Coffee" without adding the percentage of adulterant." Concerning the Scientific Department, a most useful resolution was passed with reference to the Guarantee Analysis of fertilisers sold to Planters by different firms be periodically verified by the S. O., and that if he had too much to do, Coorg and Mysore might spare their Assistants for a month in the year.

This subject is on to-day's Agenda paper and a reply to be sent to the S. O., as to whether this Association intends to take advantage of the Resolution.

And with reference to indigenous manures a resolution was carried to the effect that a small Committee be appointed to go into the matter of the export of indigenous manures before the next meeting. And firms supplying the commonly used fertilisers be asked to explain the difference in cost per lb. of Nitrogen, Phosphoric acid and potash as supplied by them.

As regards non-Service of Warrants it was suggested that the U. P. A. S. I.—write to the District Inspector-General of Police, Southern Circle, with the hope that he would issue orders to all Superintendents to the following effect:—

"That any Magistrate issuing the warrant to a Maistry should notify the D. S. P. of the district concerned that such a warrant has been issued.

"That all hand warrants should also be endorsed by the D. S. P. of the district in which the warrant is to be served or by his office Manager.

"That, on the enquiry of a Planter as to the status of any particular Maistry, the Superintendent of Police for the district in which the Maistry lives shall make enquiries as to the Maistry's standing and means and report the same to the Planter."

Two exhibits from this Association were sent to the U. P. A. S. I. Exhibition. Rubber from Mr. L. E. T. Short and Fibre from Mr. J. C. Large.

Mr Short's Ceará Rubber samples, coagulated with water without any acid showed what an advance had been made with this at one time despised and neglected source of rubber.

- (b) The Accounts after being audited by Messrs. C. Rahm, and F. Carey were passed, showing a balance in hand up to end August 1912, of Rs.236-0-4.

Proposed by Mr. W. I. Lechler and seconded by Mr. J. C. Large and carried unanimously: "That a hearty vote of thanks be accorded to the Honorary Secretary for his past year's services and for kindly representing this Association at the late U. P. A. S. I. Meeting, also that his reports be adopted, printed and circulated to all members."

(2.) *Fertiliser Analyses*.—Read circular No. 639 dated 29th August from Planting Expert. Resolved: That this Association accepts with thanks the resolution passed at the last U.P.A.S.I. Meeting with reference to Fertiliser Analyses, and that the Honorary Secretary be instructed to inform the Planting Expert that four different fertilisers are likely to be sent in for checking about the months of April and May.—*Carried unanimously*.

(3.) *An appeal for assistance from P. B. Fund*.—The steps taken by the Honorary Secretary in the above case met with the approval of the Meeting.

(4.) Read letter dated 15/9/12 from Mr. S. C. Cobbe to Honorary Secretary *re.* absence of Registrar's Clerk from office on office day. Resolved: "That the Honorary Secretary be requested to write to the District Registrar to enquire whether in the absence of the Registration Clerk, the Sub-Registrar himself is not bound to execute registration work on an office day."

(5.) *Roads*.—Read letter dated 12/9/12 from Mr. J. C. Cobbe, *re.* culverts for Kiliyur cart road and letters dated 15/9/12 from Messrs. E. Large, S. M. Hight, and W. Hight *re.* decrease in width in places on the Yercaud to Vellalakadi cart road by the D. P. W. owing to system of scraping away the earth on both sides of the road surface, and small cross drains. Proposed by Mr. S. M. Hight and seconded by Mr. E. Large. "That—in view of the alarming manner in which the contractor is reducing the width of the feeder road in places, during the course of upkeep, by cutting the earth from both sides of the road surface to the centre, thus reducing the original width and level of the road in each process, causing boulders to crop up which were originally below the road surface, and which are a source of danger to traffic and also the number of Irish bridges and cross drains—the Honorary Secretary be requested to draw the attention of the Executive Engineer, Salem, to the above facts—with the request that the feeder roads be kept up to their original width of 12 feet throughout, all boulders removed, Irish bridges filled in, and culverts substituted on both this and the Kiliyur roads, also that the three zigs situated near High-fields Vellalakadi and Mangalam be improved to enable cart-traffic to get round without difficulty."—*Carried unanimously*.

(6.) Read letter No. 693 dated 21/8/12 from D. B. Engineer to Honorary Secretary stating that Rs.4,000 had been sanctioned for the purpose of forming a road from the head of the Salem Ghat Cart Road to the Varniah Cart Road. Recorded with satisfaction.

(7.) Read and recorded letter No. 657 dated 5th September, 1912, from Planting Expert with reference to "Bees and Coffee Fertilisation."

(8.) *Election of Office Bearers*.—The following gentlemen were elected office bearers for the coming year.

Chas. Dickins (Chairman and Honorary Secretary).

Committee.—Messrs. C. G. Lechler, J. C. Large, C. Rahm, S. M. Hight, W. Rahm, F. D. Short and Revd. Rochét.

A vote of thanks to the Chair terminated the Meeting.

(Signed) CHAS. DICKINS,

Hony. Secy. & Chairman.

Bababudin Planters' Association.

The First Annual General Meeting of the Association was held at Santaveri, on Wednesday, September 18th, 1912.

PRESENT.—Messrs. Denne (President), Dennis, Boyd, Johnson, Kerr, Oliver and Kirwan (Honorary Secretary).

PRESIDENT'S ADDRESS.

Gentlemen,—This is the First Annual General Meeting of the Bababudin Planters' Association and I am glad to be able to congratulate you on bumper crops and good prices for last season and I hope that prices will keep up for some seasons, as after the long period of low prices we deserve good prices for some time to come.

Scientific Assistant.—During the year a good deal of progress has been made in connection with the Planting Industry in Mysore and, most important of all, a Scientific Assistant has been appointed and some of us have had the pleasure of welcoming him to our estates, and, I hope, during his time among us he will be able to do great things for coffee planters with the advice of the Scientific Officer.

Council.—A Council of the Mysore Planters' Associations has been formed which is a step forward and shows that Mysore Planters are trying to pull together and combine, and combined, we are much stronger than separate. Through the Council it should be possible to do much, among other things fix rates of coolies' wages, commission, &c., and I hope that no increase in rates will be started by anyone until the Council and all the Planters' Associations have agreed to it.

Experimental Plot.—An Experimental Plot under the U.P.A.S.I. has been started on the Nilgiris to hybridise coffee and obtain for us a new plant and I hope it will be successful and produce one that will crop well, be free from leaf and other diseases and produce a sample that will sell in London at a good price. I myself believe that what we want is a hardier plant and put more faith in that than in anything else yet proposed to assist the coffee industry in India.

Coolies' Pay.—Prices now are good, but if they fell as they are certain to do in a few years, how can we afford higher pay and if the pay of coolies is once raised it will be very difficult to lower wages again.

Labour.—Labour is, I think, the most gloomy subject of all. Labour is being drawn away from Mysore by Ceylon and other places who can afford to pay higher wages than coffee planters. Agencies were started last year on the M. & S. M. Railway by Ceylon to recruit coolies almost at our doors. I am glad to say when it was represented to the Ceylon Agency, the recruiting Depôts were removed, but they still have a recruiter in Mysore. Some of us have lost Mangalore coolies who have been attracted by higher pay to Rubber Estates. The coolies are also becoming more prosperous and leaving the estates in large numbers every year to start cultivation in

the 'Maidan country' a great deal of new land has been taken up in the last year or two for cultivation in 'maidan.' A proposal was put before the U. P. A. Meeting to start a scheme of voluntary Registration of labour—this is a move in the right direction as something must be done in this our most important question, and if this or some other scheme is found to be practical, I hope this Association will support it.

Pests.—I understand that the Green or Pulney bug is in Bangalore at some of the gardens and that plants of various sorts are continually being sent up to the District, and we run very great risk in importing the Pulney bug with these plants to our estates. Native planters also import plants from the Lal Bagh and other gardens in Bangalore. I would suggest that fruit and other plants in future should be procured from places where there is no green bug such as Saharanpoor, Poona and other places. I think Native planters also ought to be warned of the destruction that green bug has caused on the Nilgiris and Shevaroy's, where estates have been entirely ruined by it. I do not know if it is possible to get the Mysore Government to introduce a Pest Act and enforce it in Bangalore from where plants are distributed all over the Province. Some orange plants were actually sent up to a planter last year with Pulney bug on them. Luckily he detected it and destroyed the trees.

Finance.—I have said nothing about this as the Honorary Secretary in his report will tell you about it.

I now have to thank you for the honour you have done me in electing me President, and I am sorry I have not been able to spare more time to attend to Association work, and I have to thank the Honorary Secretary for the assistance he has rendered me.

I now place my resignation in your hands and do not seek re-election.

Honorary Secretary's Report and Accounts. The accounts as audited by Mr. Watson were laid on the table and explained by the Honorary Secretary and passed by the Meeting.

Delegates to U. P. A. Meeting.—Mr. Oliver read a short report of what took place at the U. P. A. Meeting with reference to matters in which this Association is interested.

A vote of thanks to the Delegates was passed.

C. of P. A's.—The Association agreed to the voting being on the basis proposed by the N. M. P. A.

A letter from the Scientific Officer with reference to the proposed tour of Mr. Bainbrigge-Fletcher, to investigate the question of the necessity of Bees in Fertilising Coffee was read. Mr. Oliver offered to make arrangements to show Mr. Fletcher round should he come to this district.

Black List for Maistries.—A letter from the Secretary of the S.M.P.A. was read. It was resolved that the Association would be very glad to join in the scheme, and hoped the S. M. P. A. would formulate a scheme.

Election of Office Bearers resulted as follows :—

President, Mr. A. B. Boyd ; Vice-President, Mr. A. C. W. Denne.

Honorary Secretary, Mr. N. G. B. Kirwan.

A Vote of thanks to the outgoing President and Honorary Secretary was proposed by Mr. Oliver and seconded by Mr. Dennis.

(Signed) NOEL G. B. KIRWAN,

Honorary Secretary.

RUBBER.

Ceara Rubber.

The Annual Report of the Department of Agriculture of the Uganda Protectorate, according to the *India Rubber Journal*, shows that Ceará found some favour during the year with a certain section of the planters, and several estates are confining their attention very largely to this tree. A number of the planters have always been sceptical as to the merits of this tree, and latterly some of the Ceará enthusiasts seem to be joining the doubters. The advantages of Ceará are that it may be expected to give a quicker return, and a further advantage, which no doubt accounts largely for its extended cultivation, is the extreme ease with which it can be propagated.

The question of the advisability of planting *Manihot glaziovii* is one that many planters would like answered. A method of tapping that gives some promise is the system of vertical pricking with the multiple pricking tapper. The area of the Protectorate over which the Ceará tree grows freely is so much greater than that suited to other kinds of rubber, that the question is one of some importance.

There can be no doubt that the rubber is there, and the problem is to find a method of tapping that is suited to the tree,

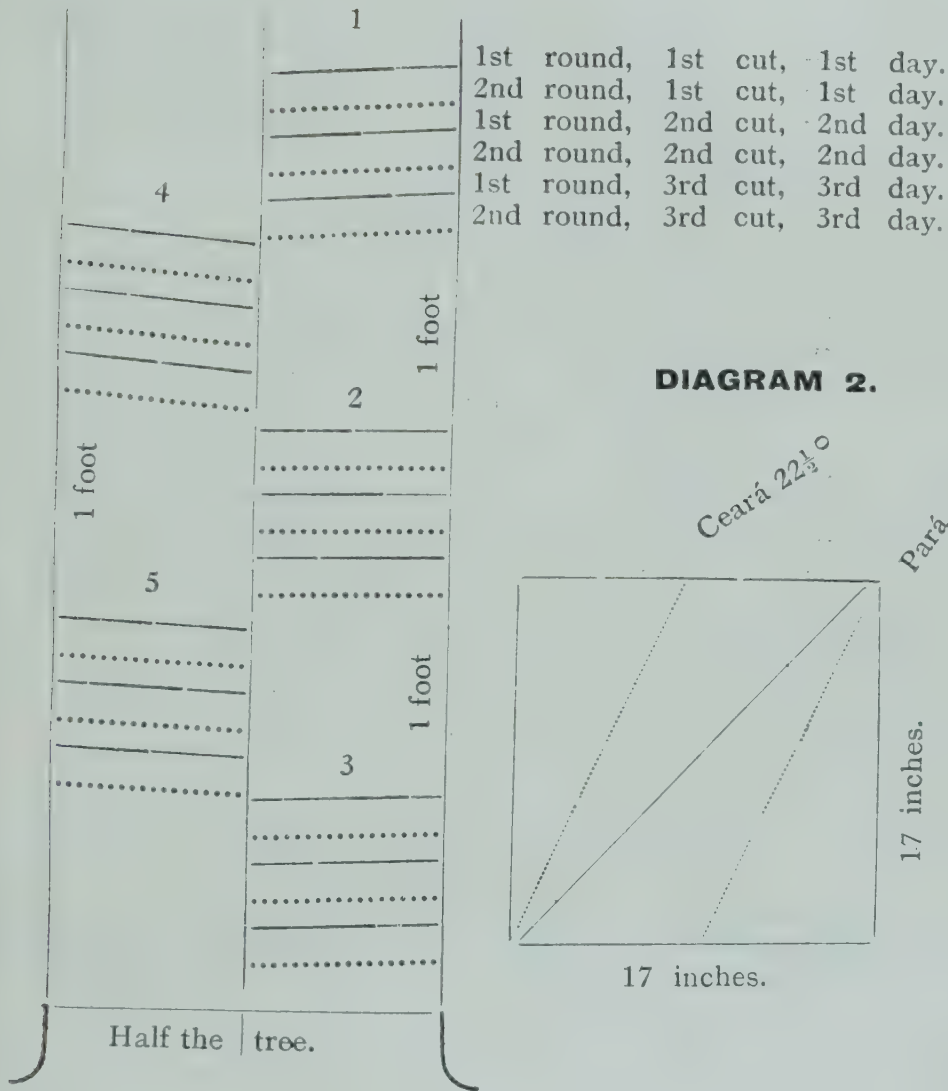
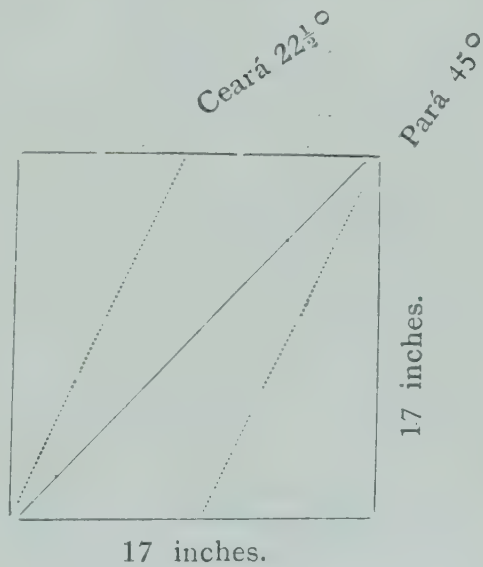
In forwarding the following notes upon the methods of tapping Ceará Rubber and the results obtained, Mr. A. G. Nicholson, Coonoor, states that the results were obtained "under very adverse conditions of weather." He adds that, "the U blade we make to fit the Pask Stock is double edged, so that when one side is worn it may be turned over and the other used. They cost Rs. 6 per dozen." He also calls attention to the effect that "the angle of marking for Ceará should be $22\frac{1}{2}$ degrees. A piece of tin 17 inches square is cut as for marking Pará and the Ceará marking tins are made from it as shown in Diagram 2."

The Ceará trees from which these results have been obtained are planted amongst young Coffee 8x8 in alternate lines and thus average 12x12 itself.

Method of Tapping.

Tapping is done with a special U blade fitted to a Pask Stock introduced by me 3 years ago, which if properly set renders injury impossible unless the cooly goes *twice* over the *same* cut the *same* day.

1. All trees to be tapped alternate days or daily according to the weather, one cut only in each foot each day.
2. Knives to be set so that they *cannot* cut more than $\frac{1}{8}$ " wide and $\frac{1}{8}$ " deep. If too deep, the deep tapping cuts off the supply of latex for the 2nd round *above* the deep cut, and the yield decreases.
3. Knives must be as sharp as razors.
4. In the diagram (I) each cut is supposed to be $\frac{1}{8}$ " wide, and each cut to represent one day in each foot.
5. The cuts are $\frac{1}{8}$ " apart for 1st round, and 2nd round the cuts come in between 1st and 2nd cuts of the 1st round, for the 1st day, between 2nd and 3rd for 2nd day, and so on, still only one cut per day in each foot.
6. Put the cuts in $\frac{1}{8}$ " apart and use $\frac{1}{8}$ " guide bamboo strips for ruling the lines $\frac{1}{8}$ " apart, *before* cutting, as this keeps the lines equidistant, they look better, tapping in the future is easier, and the maximum number of cuts are got in.

DIAGRAM 1.**DIAGRAM 2.**

[Each foot one cut per day. This diagram shows five tapping lined numbered 1 to 5, one for each round, 15 cuts the first round of 3 days, 15 cuts the second round of 3 days. Total, six days, 30 cuts as per diagram.]

Each foot will give 48 days both sides of the tree, 96 days for each round.]

Results.

3rd Year tapping.

Trees planted in 1906.

Tapping alternate days 1st 3 weeks, after that daily. The cost includes women carrying water a long distance.

		Trees.	Coolies.	lbs. wet.	Cost		
					Rs.	a.	p.
8th June	...	2,497	30	20'0	9	0	0
15th "	...	3,340	35	32'3	12	13	0
2nd "	...	3,600	36	49'8	14	9	0
29th "	...	4,500	36	59'8	14	9	0

Rainfall—January to June 30th, 8'61

Daily tapping this month.

6th July	...	5,720	46	50'0	16	9	0
5th "	...	4,800	48	54'0	16	6	0
20th "	...	6,000	48	65'0	17	8	0
27th "	...	6,000	48	61'2	17	0	0

Rainfall—January to July 31st, 8'91.

3rd August	...	5,260	42	60'0	17	2	0
10th "	...	6,000	48	68'11	18	10	0
17th "	...	5,250	42	58'14	17	4	0
24th "	...	5,250	42	56'4	17	6	0
31st "	...	5,250	42	57'7	16	6	0

Rainfall—January to August 31st, 13 inch 4 cents.

100 lbs. wet sheets dried separately gave 47½ lbs. dry, but a second test is being made as stocks show better results.

In a Report on the Government plantations at Kampala it is stated that:—

"The Ceará planted during the year has been planted at various distances apart, with the object of determining the most suitable distance; 1½ acres have been planted 12 feet by 12 feet, 1½ acres 14 feet by 14 feet, 5 acres 16 feet by 16 feet. All of these being planted on the square system and 5 acres 16 feet by 16 feet one the hexagonal system, which gives a more equal distribution of the trees and a greater number per acre than the square method. The growth of the trees, all round, has been very good, and the breakages by wind have been very few, and in those cases where the tops have been broken off a new top has speedily been formed. Tapping was commenced on 20 trees on the 15th November and continued to the end of December. The yield was small, but the trees were young, and the season not very favourable. These trees were again tapped in March, and gave better results, and 20 smaller trees were also tapped, these giving similar results to those obtained with the trees tapped in November and December. The method of tapping in each case was the "half-herring-bone" to half the circumference of the trees, paring and pricking immediately afterwards. The height tapped to, in the first instance, was 4 feet, but in the two latter instances 5 feet, the lateral cuts being 1 foot apart at an angle of 45 degrees. No chemicals were used in the first instance, but in the two latter instances a dilute solution of ammonia was placed in the collecting cups to prevent coagulation."

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THE U. P. A. S. I.

(INCORPORATED.)

U. P. A. S. I. Section.

In last week's *Chronicle* was published The Registration Scheme passed at the last Annual Meeting in August. The Chairman wishes that all the Members should have their attention specially drawn to it, and hopes that every Member will study it, and that any suggestions that they may have to make, may be sent to the Secretary, who will forward them to the Sub-Committee formed to draw up a workable scheme before the next Annual Meeting.

A letter from Messrs. Parry & Co., is published, calling attention to a clerical error that was made in the advertisement about Finely Crushed Bone Meal.

An extract from Mr. Webb's letter to the *Times of India* is published which emphasizes the letter by the same gentleman lately printed in the *Chronicle*.

The Scientific Officer continues his article on the Prevention of the Introduction of Insect Pests and Fungoid Diseases of Plants, also contributes a valuable paper on Superphosphates and Rubber Tapping. The Relation of Ants to Plants also finds a place, and the Intensive Farming in India by John Kenny is the subject of a short review.

Mr. Sandow's advertisements, praising cocoa at the expense of tea, has roused much antagonism as will be seen by the extracts published. Under the heading "Rubber" is reprinted a long and interesting article on its development, cultivation, trade and industry.

The attention of all readers who may have urgent reasons to communicate with the Secretary by telegraph are advised that "Planting" has been registered as the surest means of reaching him.

All telegrams meant for the Scientific Officer should be addressed, Anstead, Bangalore.

Correspondence.

Dear Sir,—We regret that by a clerical error we have given in our advertisement our guarantee for "Steamed Bone Meal instead of "RAW" and shall be obliged if you will kindly alter this in your next issue. Our guarantee for Raw Bone Meal, for which we quote Rs.69 per ton Rails Ranipet is 4 to 4½% Nitrogen, 22 to 23% Phosphoric Acid.

To explain matters we should much appreciate it if you would kindly publish this letter in your columns.

Yours faithfully,

Madras, 2nd October, 1912.

(Signed) PARRY & Co.,
Managing Agents.

Scientific Officer's Papers.**CIX.—PREVENTION OF THE INTRODUCTION OF INSECT PESTS AND FUNGOID DISEASES OF PLANTS.***(Continued.)*

To prevent a plant disease which has been introduced into the country from being spread from one district to another is a difficult matter especially in a country like India. Legislation on the subject would have to follow the lines of the legislation introduced to prevent the original introduction of pests from other countries which was outlined in the first part of this paper, and it would be most difficult to enforce. Possibly education and co-operative action among big bodies of planters would do more good than actual legislation.

That there is a necessity for some sort of action is, however recognised, and it is noticeable that at a recent Annual Meeting of the Bababudin Planters' Association as well as at the Annual Meeting of the U. P. A. S. I. the subject was brought into prominence.

At the former meeting the President in his address said:—

“I understand that the Green or Pulney bug is in Bangalore at some of the gardens and that plants of various sorts are continually being sent up to the District, and we run very great risk in importing the Pulney bug with these plants to our estates. Native planters also import plants from the Lal Bagh and other gardens in Bangalore. I would suggest that fruit and other plants in future should be procured from places where there is no green bug, such as Saharanpoor, Poona, and other places. I think Native planters also ought to be warned of the destruction that green bug has caused on the Nilgiris and Shevaroy, where estates have been entirely ruined by it. I do not know if it is possible to get the Mysore Government to introduce a Pest Act and enforce it in Bangalore from where plants are distributed all over the Province. Some orange plants were actually sent up to a planter last year with Pulney bug on them. Luckily he detected it and destroyed the trees.”

The matter is under discussion at present between the Scientific Department of the U. P. A. S. I. and the Mysore Economic Botanist, and it is possible that a system of fumigation may be voluntarily adopted at centres of distribution like the Lal Bagh Gardens, and other horticulturists gradually taught and encouraged to adopt similar preventive measures by means of demonstrations, and through the medium of the Horticultural Society recently formed in Bangalore. This matter is under discussion and no more can be said about it for the present, but the Scientific Department of the U. P. A. S. I. have recognised that it is a very serious matter.

There is possibly a certain amount of danger in importing Tea Seed from districts which suffer from Blister Blight. At the Annual Meeting of the U. P. A. S. I., held in 1911, Mr. McRae, the Government Mycologist, speaking on the subject said:—

“Half the difficulty was to know how it got into the District. He was perfectly convinced that he knew how it got in. He was certain it was introduced from the outside, but there was not enough proof to bring it home that it came either from North-East Assam or from the jungles round Darjeeling. For about a fortnight he hunted all the jungles, but he did not get a particle of anything like blister, and he could not get anyone to confess that he saw blister blight shortly after using imported seed. He saw some badly blighted tea in a block in which some new plantations had

been opened and he was quite convinced that it was introduced from North-East Assam in the tea seed, or packages of earth in which the seed came. He could not prove it, however, and there was no one brave enough to say that he introduced it. He would certainly advise all planters getting seed from Northern India to disinfect it, by destroying the packages of earth in which the seed comes and to disinfect the seed by steeping it in formal in or corrosive sublimate for an hour. These two would he found quite sufficient. It was quite easy to kill the spores of blister blight; even a very weak solution of salt was sufficient. It did not matter what disinfectant they used, as long as it was done thoroughly. He would certainly advise no planter to get tea seed from northern parts round Dibrugarh and Darjeeding—he knew that the best tea seed did come from Dibrugarh—if he was unwilling to run the slight risk of introducing the disease.” *Book of Proceedings, 1911.*

It would seem comparatively easy to arrange for such disinfection as recommended without the aid of legislation, and possibly the difficulty of confining known diseases to certain districts could be very largely got over by co-operative methods among planters, but it is very important that planters should realise the dangers which they run when they import seed or plants from outside districts.

(To be continued.)

RUDOLPH D. ANSTEAD,
Planting Expert.

ANTS IN RELATION TO PLANTS.

It is commonly supposed that ants are injurious to cultivated plants, due to the general occurrence of ants on diseased and sick trees. There are probably, however, no kinds of ants directly injurious to plants except the leaf cutting species found in South America. The ants which are so often found infesting the plants and even making their nests at the roots of trees are present for a particular purpose, and are usually associated with the presence on the tree of Aphis or Scale Insects. Some species of ants take care of aphis (green fly) and make use of them in a manner comparable to man's treatment of such domestic animals at the low.

Many of the Scale Insects so common in India excrete a sweet liquid on which the ants feed and plants infested with scale insects frequently swarm with ants going from one scale to another in search of food. In some cases the ants erect mud shelters over these scales as is seen in Coorg where they protect the Mealy Bug which attacks the coffee roots in this way bringing the scales into shelters made on the branches of the shade trees. Sheltered in this way the scales live in safety from their enemies and adverse climatic conditions repaying the ants for their care with supplies of honey dew.

Ants also make galleries up the stems of some plants under cover of which they ascend, and in these galleries scale insects are often found. Again ants infest the roots of plants attacked by scales. In all these cases the ants probably protect the scales from which they derive food from attacks of their enemies, and they in all probability also carry the eggs and young scale insects to suitable places on the plant and thus work in their distribution.

This natural arrangement between the scales and the ants is indirectly harmful to the plants and any scheme for the eradication of scales must probably take into account these swarms of insects also.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Superphosphates.—It is not always understood that in Southern India soils are as a rule very deficient in Carbonate of Lime, and that the system of manuring adopted with large quantities of organic material together with the organic mulch from the shade trees in the case of coffee, tends to make the soils acid. The consequence is that acid manures like superphosphate are not suitable, and though Basic Superphosphate may be an apparently wasteful form of phosphatic manure it suits our conditions. Ordinary Superphosphate is an acid manure which upon soils containing little or no Lime is not so desirable as fertilisers of a neutral or alkaline nature. Basic Superphosphate is produced by the addition of Lime to ordinary Superphosphate which renders it alkaline, and although not so soluble a compound as ordinary superphosphate it is easily dissolved by the organic acids in the soil water and it becomes readily available to plants. When superphosphate is applied to the soil the soluble phosphoric acid it contains is rapidly precipitated. To some extent the clay in the soil provides the necessary base for this process, but in most soils the Calcium Carbonate takes the chief part in the reaction with the production of dicalcium phosphate. The best effects are therefore obtained from ordinary superphosphate only when applied to soils which are at least moderately well supplied with Lime, and in the absence of this constituent the value of the manure will be considerably diminished, Hall in his book on 'Fertilisers and Manures' says:—"The essential condition that should dictate the choice of superphosphate as a fertiliser is the presence of sufficient carbonate of lime in the soil to ensure the precipitation of the soluble phosphoric acid as a calcium compound. On acid soils, on some clays, and on many sands and gravels, there is such a deficiency of carbonate of Lime that the phosphoric acid becomes precipitated as Iron or Aluminium phosphates which possess a much lower solubility in the soil water and are therefore less available to the plant." Our soils are deficient in calcium carbonate and many are either acid or on the verge of acidity and for this reason ordinary superphosphate is not a suitable manure and a Basic phosphatic manure *must* be used. Probably the best method is to apply Lime first and then the Superphosphate and thus secure the advantage of their more uniform distribution in the soil which their solubility in water when separate ensures, but the cost of Lime sufficient for this method of treatment is prohibitive in this country.

Rubber Tapping.—In the article on Ceará Rubber published in last week's *Chronicle*, the distance apart of the trees in question was 16 x 16 and not 12 x 12 as stated. An obvious misprint also occurs at the foot of the diagram. The first two lines should read, "Each foot one cut per day. This diagram shows five tapping lines numbered 1 to 5, one cut for each round, &c." Mr. A. G. Nicholson, Coonoor states that he is tapping and curing Hevea Rubber on Hawthorne Estate at 3 annas 4 pies per pound of dry rubber, and Ceará Rubber at 5 annas 5 pies per pound of dry rubber which he points out, "speaks well for hill rubber especially for Pará with scattered trees in thick Coffee." It would be interesting to know how these results compare with those obtained by other planters, and it is hoped that information of this nature will be sent in to this Department for publication.

Rainfall.—Bangalore has lately been experiencing very heavy rains. During September 21.66 inches fell in the Station and this constitutes a record, the highest fall of recent years in September having been 18.58 inches in 1897.

R. D. A.

INTENSIVE FARMING IN INDIA.

BY JOHN KENNY. HIGGINBOTHAM & Co., 1912.

This book is a compilation of a number of pamphlets which have been published by the author from time to time into one volume. It is written primarily for the raiyat and does not contain very much that is of special interest to the planter, though there are chapters on the manuring of Tea and Coffee.

The author pins his faith on the use of artificial manures to be obtained through co-operative agricultural Associations. Those who have the agricultural welfare of the raiyat at heart do not all agree that his salvation lies in the use of expensive artificial fertilisers that require skill to use, however.

In a thoughtful paper by Messrs. Meggitt and Birt published as an appendix to the Proceedings of the Board of Agriculture in India for 1911 (Superintendent of Government Printing, Calcutta, 10 annas) the view was put forward that soluble artificial manures of a forcing character, highly expensive, and capable of being abused in unskilled hands, are not suited to the improvement of Agriculture in India as far as the raiyat is concerned. The authors are turning their attention to more permanent methods of soil improvement, those more calculated in their opinion to keep up a healthy vigorous soil constitution and soil climate and more suited to the necessities, natural resources, and economic conditions of India and its people. They strongly advocate a system of manurial practice under which the organic matter and Nitrogen required for the crop are obtained from the atmosphere by the aid of leguminous green dressing crops, and the only manures to be directly added are in the case of acid soils a very occasional dressing of lime and rather more frequent dressings of bone-meal, and in the case of alkaline soils only bone-meal at intervals. The addition of nitrogenous organic matter should be augmented by dressings of cow manure, the only manure generally used by cultivators at present. Such a system with a suitable rotation of crops they consider capable of yielding large profits and keeping up the permanent fertility of the land.

The chapters on Tea and Coffee manuring are frankly disappointing. The former chiefly consists of numerous quotations to back up the author's opinion that the burial of prunings is a bad practice, an opinion with which a large number of planters in Southern India will not agree in the light of their experience of this practice.

Instead of burying the prunings, "the safer plan in the writer's opinion, would be to remove them and after stripping off the leaves at some central spot to stack the branches for future use as fuel and to allow the leaves to decompose in a heap, sprinkled with some soil and a little freshly burned lime." The cost of removal has been lost sight of and it would be prohibitive in these days of shortage of labour. If prunings are not buried the only practical alternative is to burn them and scatter the ashes and replace the Nitrogen by means of organic fertilisers.

In the case of Coffee the author recommends the more extensive use of Potash as a fertiliser, and in this he is in all probability right.

The book contains a great many irritating misprints, but it is worth reading and much that the writer has to say is well worth the attention of his audience, and it is to be hoped that his book will find a place where he wishes it to, "in the homes of the peasants translated into the various vernaculars of the country."

TEA.

A Deleterious Advertisement.

A certain objectionable method of advertising Cacao in opposition to Tea by implying that Tea drinking causes one of the most dreadful diseases from which modern humanity suffers, together with the comments it has called forth in Ceylon and London will probably prove of interest to Tea Planters in Southern India.

“ ‘ *Does Tea cause Cancer.* ’ is the heading of “ Sandow’s Cocoa ” advertisement which is inserted daily in the London and leading provincial papers and which unproved, injurious questions is thus being sunk into the minds of the vast number of readers and yet no one here moves a finger to make those strong representations which should put a check to traders’ activity in thus framing an advertisement to damn a British industry. It comes particularly badly from Mr. Sandow, a German, who has made England his home and has apparently made plenty of money by pushing his various ventures in England. He bases his heading upon a book by the Hon. Rollo Russell, the author of “ Preventable Cancer,” who points to seven countries, coffee consumers, which had the maximum cancer rate, and to England with the highest quantity of tea per head which now has the maximum cancer rate. It would be interesting to know where Australia, with its high rate of tea consumption per head, stands as regards the cancer rate. An active movement to re-assure the public mind after this bout of adverse advertising is very advisable. Query—in what quarter are we to look for initiating this movement?”

“ Since writing this I hear late to-day that the views above given are also those of several influential colonists, and the matter has been taken up as far as writing to the Secretary, Ceylon Association in London, to draw his attention to this matter, suggesting that action should be taken without delay.”

Thus A. L. H. in “ Current Coin ” in the *Weekly Times of Ceylon* of September 14th. The *Grocer* for August 31st also deals with a similar advertisement, or possibly the same one, as follows :—

“ Little surprise will be occasioned among members of the trade by the indignant protests which are being made against the unwarranted attack upon the tea and coffee trade which is contained in the advertisement that is quoted in our Correspondence pages to-day. It raises the question, “ Does Tea cause cancer ? ” and by implication, if not directly, answers it in the affirmative. The advertisement is one of the most indiscreet we have read for a long time past. It is calculated to do considerable harm to the tea and coffee trades by fostering the idea that these wholesome, valuable, and popular, beverages are “ a prolific cause of cancerous disease ; ” and it cannot fail to have undesirable results upon the trade of the advertisers themselves, for retail grocers have a very practical way of showing their resentment towards advertisements or advertising methods which they deem to be objectionable, and they will not suffer any unwarranted attack upon such an important section of their business as tea and coffee, particularly the former, represent. It is folly to attempt to foster the sale of an article such as cocoa by giving currency to theories which are calculated to inflict severe damage upon the tea and coffee business, and which a credulous section of the public may accept as actually proved and demonstrable facts. There is nothing whatever in the work on

“ Preventable Cancer ” to prove that any case of Cancer has ever arisen or could arise from the consumption of tea or coffee, and the advertisement referred to, if continued, is certain to cause wholly unnecessary alarm and to prejudice tea and coffee without in any way promoting the popularity of cocoa, more especially as on the same page of the book as the “ drug ” paragraph appears, is a strong indictment of all hot foods, the author even maintaining that hot mashes are the cause of cancer in cattle; and as mashes are generally made of linseed, the “ potent drug ” cannot here be held responsible. We most emphatically condemn advertisements in the public press such as that under notice, and if the advertisers consult their best interests they will withdraw it at once.”

THE CENSUS OF CEYLON, 1911. ESTATE STATISTICS.

We have to thank Mr. E. B. Denham, the Superintendent of Census Operations, Ceylon, for another of his valuable Reports, this time dealing with estates only, and giving by name each estate enumerated by its Estate Superintendent or by some persons appointed by him, and the principal estates enumerated through the village headmen, together with the names of the Revenue and Planting District of each estate, and separate figures as to males and females, races, religions, and literacy of the population on each estate.

An estate map of Ceylon showing the planting districts and a map showing the district in the Madras Presidency, from which labour is principally recruited, have also been included in this volume, while figures in a separate table give valuable information as to the districts in India from which the estate labour is drawn; they show the number of immigrants from each district in South India. This is the first Census, Mr. Denham says, at which it has been found possible to obtain these figures. At this Census all persons born in India were required to state the district in India, or the Zillah or Taluk—or at least the nearest post town—of the village in which they were born. The register kept under Ordinance No. 9 of 1909 was of considerable use in supplying this information on the estates. The co-operation of all responsible for the enumeration of the estates is gratefully acknowledged. In a very large number of cases, however, the village names were only inserted in the schedules, and these had all to be traced through the Madras Post Office Guide, Gazetteers, etc. The names had frequently to be repeated aloud and pronounced by different persons in order to arrive at any idea as to what name was meant, many of the enumerators having no knowledge of Indian names and in some cases of any Indian language. The labour involved in tracing the place names was considerable, but the results are successful. Out of 470,651 entries of birthplaces in India, is only 8 cases the Province of birthplace could not be traced, and in only 22 instances had the heading “ Madras Presidency ” only to be given. Figures for the estate population of the island are also given by sex, race, religion, age, civil condition and birthplace. It is hoped that the figures given for each estate are accurate, but it must be realised that in several instances where estates are sub-divided, *e. g.*, in the case of groups, and where portions were enumerated by different enumerators, there was likely to be some confusion as to the figures for each separate division; while the total for the group which was all that was actually required for Census purposes was correct, the figures for separate estates in the group may not always have been correctly apportioned. Mr. Denham winds up his remarks with the announcement that copies of the volume under notice will be forwarded free—on application to him—to estates where the colies were enumerated at the Census by the Superintendent or by some person

appointed by him. We congratulate Mr. Denham on the most interesting and successful manner in which the present volume is brought out.

The following is the summary of the estate population in the island in 1911 :—

Province.	No. of Estates.	Persons.	Males.	Females.
Western ...	173	44,145	25,334	18,811
Central ...	958	379,317	148,767	133,550
Northern ...	6	202	115	87
Southern ...	47	9,486	5,694	3,792
Eastern ...	4	381	309	81
North-Western ...	156	15,006	9,412	5,594
Uva ...	192	71,957	38,180	33,777
Sambaragamuwa ...	297	92,973	50,757	42,217
Total ...	1,833	513,467	278,558	234,909

Out of the above totals, 17,495 males and 7,911 females are Low-country Sinhalese ; 7,564 males and 5,529 females are Kandyan Sinhalese ; 10,103 males and 9,362 females are Ceylon Tamils ; 234,594 males and 205,708 females are Indian Tamils ; 1,683 males and 823 females are Ceylon Moors ; 2,078 males and 1,627 females are Indian Moors ; 1,635 males and 730 females are Burghers and Eurasians ; 661 males and 576 females are Malays ; and 2,397 males and 1,911 females are others.—*The Ceylon Observer*.

ADVERTISING INDIAN TEA IN AMERICA.

A very long and interesting letter has been received at the Office from the Indian Tea Cess Committee regarding the good work being done by Mr. R. Blechynden, the Cess Commissioner in the United States, in advertising and pushing Indian Tea in the States. Unfortunately, the report from Mr. David Pym, formerly a Member of the Executive Committee of the Cess to the Secretary, Indian Tea Cess Committee, is too long to publish *in extense* in the *Chronicle*. Mr. Pym reports very highly of the work being done by Mr. Blechynden. At present Mr. Blechynden is concentrating all his efforts in St. Louis, where little or no tea has been drunk, very good pioneer work has been done. To reach and capture such large cities as Chicago more funds are required on the Canadian Coast. Indian Tea has got a firm and increasing hold there. The world's Fair will be held at San Francisco in 1915, and it is to be hoped that Indian Tea will make a brave show. Mr. Pym suggests spending £20,000 in advertising in lieu of the £10,000 now being spent. It is needless to press the advantages of advertising. 'As ye sow, so shall ye reap.' The American public have to be educated in geography as their present idea is that Darjeeling is in Ceylon. Pure Indian tea is apparently little drunk, a blend of Ceylon and Indian Tea being mostly in demand. Nor is pure Ceylon tea sold, and mostly consists of a blend of Indian, Ceylon and China tea with possibly a proportion of Formosa.

RUBBER.

Development of the Cultivation, Trade, and Industry of Rubber in the World.

The Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases for May 1912 published by the International Institute of Agriculture, at Rome, gives the following account of the Rubber Industry of the World.

"The amount of Rubber produced in the whole world is about 70,000 tons, worth about £28,000,000. Notwithstanding the use of inferior qualities and the manufacture of substitutes, the consumption of rubber has continued to increase. The struggle between wild rubber and plantation rubber is becoming always more severe, because the prosperity of many tropical countries, whose chief resource is rubber, is at stake upon the issue.

"The States interested in the question of the species of rubber susceptible of cultivation must make a rigorously scientific enquiry in order to determine the best conditions of growth, to select the seed, bearing plants and the seed, to decide upon the methods of tapping and of coagulation, and of industrial exploitation. For *Hevea* the majority of these problems are solved. The Rubber States should encourage physical and chemical research on the nature and composition of the latex, as well as on the theory and practice of vulcanising.

"The whole problem of the scientific utilisation of rubber plants presents still a number of unanswered queries. The contest between wild and cultivated rubber may drag on for some time to come, so the countries producing wild rubber should hasten to introduce the cultivation of plants adapted to their soil and climate so as to enable them to parry the blow that sooner or later is sure to fall on them.

"At present the most esteemed rubber plant of Asia is *Hevea brasiliensis* or Pará; it is indigenous to Northern Brazil and is acclimatised in Ceylon, in the Malay States and in the Straits. In the South of Brasil *Manihot* is prevalent, and in Central America as well as in the southern parts of N. America *Castilloas* are the chief rubber plants. After these, may be mentioned *Sapium* (Andes), *Guayule* in Texas and Mexico, and some *Loranthaceae* of Nicaragua and of Brazil with their rubber-bearing fruit.

"The most important rubber plant of Asia is *Ficus elastica*, the most useful of the *Ficus* which are found also in America, Africa and Oceania. The commonest lianas of Africa and Madagascar are *Landolphia* and *Clitandra*, and in West Africa the rubber tree *Funtumia elastica* (*Kickxia elastica*) the best of the several *Funtumias* is met with. But no doubt many rubber plants still remain to be discovered. Every country requires special rubber plants and it is not advisable, either from a commercial or an economic point of view to try to obtain everywhere the same product from the same plant, which would entail the risks attendant upon monoculture.

"Hitherto, however, it is beyond doubt that the best results obtained by plantation rubber have been yielded by *Hevea brasiliensis* both for quality and quantity.

"In those countries where the soil and the climate most resemble those of the home of *Hevea*, the cultivation of this rubber plant offers the greatest

probabilities of success, provided the supply of labour be plentiful. The area under *Hevea* in the Malacca peninsula is about 358,000 acres, and in Ceylon, Cochin, China and the Dutch colonies about 383,000 acres.

"The amount of labour required is enormous; still, Asia with its coolies has nothing to fear from the competition of South and Central American plantations, in which labour is much more expensive.

"Of the 75,000 tons of rubber produced last year including "Guayule," 39,000 were Brazil Pará. In 1911 the total production of cultivated rubber was 12,750 tons and this amount will go on increasing, because the *Hevea* plantations are still young. Assuming the area of Asiatic cultivations at only 592,800 acres, containing 160 trees per acre and yielding an average of 900 grams of rubber per tree, Asia alone will produce in the year 1916, 86,000 tons of rubber, that is more than the present out-put of the whole world. One of the first effects of this will be that Brazil will not be able to exploit profitably its wild rubber. The produce of Brazil and of the less accessible regions of Africa will gradually disappear from the world's markets. Every country must guard against the dangers of monoculture. Plantation rubber will also dispel the illusions entertained about synthetic rubber, which will be much dearer than the cultivated product.

"The relative importance of the various regions will be seen by the following review of their yields.

"Brazil leads, with 40,000 tons of rubber exported in 1910. But its production being stationary, does not make a further increase seem probable. There are still, especially in Acre, some reserves of *Hevea* and *Castilloa*, but their yield is limited by the exploitation and labour conditions. The forest production of West Africa was 15,000 tons in 1909. Belgian Congo exported in 1910, 3,105 tons of its own produce and about 1,000 tons in transit. German East Africa exports chiefly liana rubber. In four years the United States have imported from Mexico about 225,000 tons of *Guayule* bushes.

"During the last 10 years at least £48,000,000 of European capital has been invested in rubber plantations in British Malasia, Ceylon, Southern India, Java, Sumatra and Brneo. The menace of Eastern rubber has obliged the Brazilian Government to take measures to diminish the cost of Pará, to promote the plantation of *Hevea*, and reduce by 50% the impure duties on food stuffs. At the same time the Government hastens the construction of the Madeira-Mamore railway for the benefit of the rich rubber regions of the Acre district and of Upper Bolivia.

"On the future of rubber, owing to its vast importance, several forecasts have been made; thus it is predicted that while the financial efforts made in the East by England, Holland, Belgium, France and Germany for the new plantation will limit Brazilian and African competition, they will be the ruin of upwards of six hundred companies that have been formed for the production of rubber.

"The Rubber Growers Association of London calculates the extent of rubber plantations in the whole world at 790,000 acres, from which the yield in 1916 will be 108,000 tons. But in all these calculations a certain margin must always be left for a very important factor, namely labour, which can never be exactly valued for the future.

"The yearly percentage of the increase in the consumption of rubber is valued at 5 to 15 and even 20 per cent.

"The United States alone possess about 400,000 motor cars, and in Germany their numbers increase, yearly by 50 to 60 per cent. Canada and Japan are now launching into the rubber industry.

"Electrical apparatus of all kinds require rubber in ever increasing quantities for its insulating properties, and rubber paving will soon come into general use, besides which hundreds of new applications of rubber are constantly being invented. All this holds out promise of success to the rubber plantations.

"With the new applications of rubber and the constantly increasing demand of manufactured rubber, the trade in the raw material is daily becoming more important in the markets of the world. Besides, if rubber is required in certain industries, the rubber works themselves are dependent on other industries and further their development.

"Each of the great centres of the rubber trade deals almost exclusively with the rubber of some particular place of origin. Thus Liverpool trades in South American rubbers, London in Asiatic and, considering the future of rubber in the East, it is easy to foretell that the importance of the Liverpool market will soon be inferior to that of London; Antwerp is the mart for Congo and Amazonian rubbers, Rotterdam, Congo and Dutch East Indies, Amsterdam imports chiefly from the colonies of the Indian Ocean. Hamburg receives all the rubber required by German manufactures. Bordeaux has specialised in African varieties, while Havre purchases Pará. New York buys everywhere.

"In 1909, 1910, and 1911 the following quantities were imported by the chief centres. The total sum is larger than the amount stated as the total world-production, because sometimes the same parcels of rubber pass from one market to another.

			1909.	1910.	1911.
Liverpool	...	tons.	22,436	27,601	23,474
London	...	"	5,435	9,127	12,875
Antwerp	...	"	4,685	4,058	4,336
Hamburg	...	"	7,500	7,700	—
Havre	...	"	3,781	4,458	4,008
New York	...	"	31,129	32,946	—

"The various markets have different methods of sale.—Liverpool and London sell by public auction, Antwerp, Rotterdam and Amsterdam by tender, Hamburg as futures, New York and Bordeaux personally, for immediate delivery. For the examination and valuation of rubber in the various markets, a scientific method of classification will become always more necessary.

"It is necessary also to provide each of the markets with a station for the mechanical tests for rubber; something in this direction has already been done in Germany. At Antwerp rubber is well controlled by the "Caisse Internationale d'Anvers."

"The fundamental principle of the manufacture of rubber is based on the chemical changes following on the absorption, at a given temperature, of a certain quantity of sulphur or other similar chemical substance, which process is called vulcanising. The theory of vulcanizing has not yet been satisfactorily explained. Every kind of rubber must first be washed, purified and dried. Between the gross weight of the rubber as it enters a factory and the weight of the washed, purified and dried sheet there is a

difference due to waste which is sometimes considerable. The following table gives the average wastage for various rubbers :—

Pará Fine Amavens	...	...	16 to 18%
" " Island	...	...	18 to 20%
Sernamby Manaos	...	...	25 to 30
" Peru	...	...	30 to 35
Mozambique	...	...	15 to 20
Massai	...	...	8 to 10
Niggers	...	...	20 to 25
Kasai	...	...	8 to 10
Borneo	...	...	40 to 45
Thimbles (grass rubber)	...	...	45 to 55
Crepes	...	...	1 to 2½

"The rubber, containing the due proportion of sulphur, must be brought to a certain temperature in order to undergo the required chemical and physical modifications. After being vulcanised it is prepared in sheets, the thickness of which varies with the articles to be manufactured.

"In order to utilize old rubber, means have been sought for the regeneration of the rubber by depriving it of the free sulphur and other bodies it contains, but hitherto no one has succeeded in removing vulcanisation sulphur without completely destroying the rubber. In Germany however one factory exploits an improved process for the regeneration of the valuable matter which still exists latent in rubber waste, by employing appropriate means for transforming vulcanised rubber which has lost its original property of adhesiveness.

"The so-called artificial rubbers (factices) are substances that have nothing in common with real rubber. They are mostly drying oils like the wood-oil of China, vegetable albumen, casein, and gelatin.

"The future of synthetic rubber seems very problematic, all the more so considering what has been said above on the subject of plantation rubber."

EXTRACT FROM MR. WEBB'S SPEECH.

The Hon'ble Mr. M. De P Webb, in a long letter to the *Times of India* replies in detail to the Simla telegram defending the Government's Management of the Indian Currency and Indian Treasury Balances. Mr. Webb says :—"We find that the following sums: £8,400,000 of the Paper Currency Reserve, £18,000,000 of the Gold Standard Reserve and £14,000,000 of the Indian Treasury Balances, in all over £40,000,000 have actually beyond all doubt been removed from India and are at the present moment lying in England, partly (over £16,000,000) invested in depreciating sterling securities, partly (over £14,000,000) lent out at from 2 to 2½ per cent. to London Joint Stock Banks and other money dealers, and partly (nearly £6,000,000) lying ear-marked in the Bank of England bearing no interest at all. I have frequently urged, and still maintain, that the removal of all this money has been not only wholly unnecessary, so far as the interests of the people of India are concerned, but it has been carried out to the unquestionable loss and disadvantage of India. Moreover, the transfer of much of this money has been made in direct defiance of the recommendations made to the Government by the Indian Currency Committee specially appointed by the Secretary of State in 1908 to advise him in these currency matters."—*Daily Post*, 2nd October.

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(INCORPORATED.)

Census of Cochin State.

The Report on the Census of the State of Cochin by C. Achyuta Mendil B. A. has just come to hand and forms a most interesting record of a prosperous and progressive Native State. The following is a short digest of some of the many interesting statistics dealt with in the Report.

The total area of the State is $1361\frac{1}{2}$ square miles and the total population 918,110, with a mean density of 675 per square mile, which is equalled or exceeded by few States or Districts in India, Cochin-Kanayannur and Cranganur being the most densely populated taluks in Southern India with a density of 1802 and 1747 respectively. The enormous density of the sea board is attributed by the author of the report "mainly to the adaptability of its soil to the generous growth of the cocoanut palm. The cultivation of the tree, and the manufacture of the articles out of its produce, such as copra, oil, coir, toddy, arrack, etc., afford ample occupation to the large numbers of people living in this tract."

56'24 per cent of the total area of the State is cultivated, and 4'08 per cent. is under irrigation, and 42 per cent. of the whole cultivated area is under Rice. The average Annual Rainfall of the State is 103'44 inches.

Since the last Census in 1901, the population has increased by 13'6 per cent. and the decade under review shows a marked industrial development. The State Railway and Forest Steam Tramway have been constructed during this period. "Two timber saw mills, three or four cocoanut oil mills, a weaving mill and a number of brick and tile factories were opened during this period, and the forests were opened up for Rubber plantation on a large scale. The result of these circumstances has been a steady growth of population at what may be considered a normal rate."

The Coffee planting industry is almost confined to the Chittur taluk and most of the coolies leave the estates at the end of February and the beginning of March. Consequently as this Census was taken on the 11th March, this district showed a small number of people. In 1901 the Census was taken earlier and the population of the Neliampatis showed 3,018 while at this Census owing to the reason stated the population was only 794.

It is noticeable that the inhabitants of Cochin are on the whole stay-at-home people. 95% of the population were born in the State. The number of Cochin born people enumerated in the Indian Census outside the state was 25,047, nearly twice as many as in 1901. "This increase was chiefly due to emigration of coolies from Cochin to Ceylon which has been

going on to a considerable extent in recent years. As many as 4,056 Cochin born people are found in Ceylon. They are mostly coolies and the majority of them are from the Mundakapuram and Talapilli taluks." The author concludes that, "it seems to be clear that the outward movement in search of employment elsewhere is on the increase however slow it may be."

With regard to the religion of the people in Cochin the most noticeable feature is the preponderance of Christians over Mohamadans, which is without parallel anywhere else in India except in Travancore. There are nearly four Christians to every Mohamadan, and both sects are growing rapidly as compared with Hindus, which fact no doubt accounts largely for the increasing industrial development of the State.

Malayalam is the vernacular and official language of the State and it is spoken by over 89 per cent. of the population.

In point of literacy, that is the ability to read and write, Cochin again stands ahead of all the Districts of Southern India except Madras. In every 1,000 of the population 151 are literate, while in Mysore State, for instance, only 63 are literate. English education has also made marked progress during the last two decades, 230 people in every 10,000 now being able to read and write English.

Agriculture is the predominant occupation of the people of Cochin as it is of the people in most parts of India, exactly half the population being supported by this industry; 21 per cent. are engaged in industrial pursuits and 13'6 per cent. in commerce.

There are six Rubber Estates in the State and these employ 3,194 persons. Rubber is a growing industry in Cochin and new plantations have been opened out since the Census was taken. Coffee on the other hand is a declining industry, the number of persons employed in it having dwindled to about 1,000 as compared with 2,000, ten years ago. The Rubber Estates are all owned by Europeans and it is of interest to note that there are only 47 European British subjects in the State, and 29 other Europeans.

It is noticeable that the number of owners and managers of hotels, cook-shops, &c., have increased nearly six fold owing to the establishment of coffee shops in all parts of the State during recent years, while the number of vendors of wine and liquors have declined owing to the greater restrictions placed on the sale of liquor.

R. D. A.

THE COFFEE TRADE.

According to reports from Brazil, frost has occurred in the coffee districts of Sao Paulo, causing damage to the flowering plants, which may have a serious effect on the growing crop. Estimates as to the extent of the damage are conflicting, and it is too early yet accurately to gauge the effect on the probable out-turn of the crop. When the unfavourable reports were first received the terminal market sharply advanced, but subsequently reached somewhat on lower quotations from New York and the Continent. Naturally the reports of damage are received with a good deal of scepticism.—*The Grocer*.

DISTRICT PLANTERS' ASSOCIATIONS.**South Mysore Planters' Association.**

*Minutes of Meeting held at Chickanhully Travellers' Bungalow,
September 26th, 1912.*

PRESENT.—Messrs. F. M. Hamilton (President), W. L. Crawford, D. Jackson, P. Hunt, W. F. Scholfield, C. K. Pittcock, C. J. Hayward, L. Lake, K. Thammayer, G. N. Frattini (Scientific Assistant) and M. J. Woodbridge (Honorary Secretary).

Report of Delegates to U. P. A.—Mr. F. M. Hamilton read a report touching on all matters of interest to this Association which came up before the U. P. A. after which a general discussion took place and the delegates explained various points and answered questions.

In the course of the discussion it was decided to take advantage of the resolutions passed at the U. P. A. Meeting with reference to the checking of guaranteed coffee fertilisers. It was pointed out that the greatest care was necessary in taking samples and labelling them and the following resolution was put from the chair and passed: "That this Association is of the opinion that individuals should draw samples of any fertilisers that they buy under guarantee and may wish analyzed and should forward the samples direct to the Scientific Officer, Bangalore, and not to the Honorary Secretary.

Instructions to Delegates to the Mysore Representative Assembly.—After the selection of Mr. W. L. Crawford as Delegate had been duly confirmed by the Meeting, instructions were given him on various subjects of Local interest.

Council of Mysore Planters' Associations.—Some questions as to rules and constitution were answered.

Seat on the Hassan District Board.—A letter from the Deputy Commissioner of Hassan was laid on the table in which he stated that he could find no records in his office that the South Mysore Planters' Association had ever been asked to submit a name for nomination to a seat on the Board, but that as his own nominee had resigned, he had no objection to the South Mysore Planters' Association now submitting a name for nomination. As, however, no explanation as to why the last Association representative had been superseded without notice, the Association decided not to nominate a member at present.

A most interesting and instructive paper on lime and its connection with the fertility of the soil was read by the Scientific Assistant followed by a general discussion.

(Signed) M. J. WOODBRIDGE,

Honorary Secretary.

The Diplomatic and Consular Report on Spain says of Rubber: One half of the total imports under this class consist of raw rubber and manufactured goods containing rubber. The raw material and rubber goods of all classes have been imported during the last three years to the following values:—

			Pesetas.
1909	...	...	8,955,000
1910	...	...	10,113,000
1911	...	...	13,076,000

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.**THE APPLICATION OF LIME TO MYSORE SOILS.**

At a Meeting of the South Mysore Planters' Association held recently, Mr. G. N. Frattini, the Scientific Assistant for Mysore, delivered the following lecture.

"During my first tour of the Bababudins and North Mysore in last May and June, I was particularly struck with the very vague ideas which were often extant with regard to Lime and its relation to plant life and the soil. Until this most important constituent of the soil together with its fundamental principles is thoroughly understood, it cannot be expected that Lime will occupy the position it should in the world of Agriculture.

"I do not think it would be out of place here, to say a word or two on the origin of Lime.

"Calcium (using the technical name) is found in nature in combination with several other elements, in the form of the carbonate, sulphate, phosphate and more complex double silicates. The one which I intend to say a few words about is the Carbonate of Lime as this is the one which concerns us most in Agriculture.

"Calcium Carbonate, otherwise known as Calcite or Iceland spar, is found in the shape of colourless and well defined crystals and also in beds of what we call Limestones. The former one might say is only a transition into the latter. The crystals are acted upon by water charged with carbonic acid in which calcium carbonate is soluble. When the water loses its carbonic acid, which it does in the course of time by evaporation, the calcium carbonate in solution is redeposited in minute crystals and these in their turn become cemented together into solid beds of what are commonly called Limestones.

"Chalk Cliffs, or Beds, are a more recent formation and have an organic origin by the deposit from waters of minute living organisms, Corals, diatomaceae, etc.

"The great majority of the fossils in most sedimentary rocks contain a large proportion of Calcium Carbonates.

"Calcium Carbonate is present in most soils. According to the origin, the amount of Lime varies proportionately rising to as high as 60%, but generally in cultivated land it is not much more than 1.2% and in some cases it is almost entirely absent, the usual type of Coffee Soil to be found in Mysore contains only about one or two tenths per cent.

"Lime was known to be used in Agriculture in the very early times. It was used by the Romans; and in the earliest records of British Agriculture it was part of the routine of farming.

"In England when Liming was more general very large amounts used to be applied, sometimes as much as 6 to 8 tons per acre.

"Let us first of all consider what physical action lime has on the soil.

"Lime is usually applied to the soil as Carbonate, Hydrate, or Oxide, but no matter in which form it is applied, it eventually all becomes converted into carbonate. There is one essential factor, however, and that is, to get the best advantage from the use of lime it is most important that it should be brought into a very fine state of division before application, and the best way this can be effected is by using hydrated (or slaked) lime; a good admixture is then obtained with the soil.

"The great improvement which lime effects can hardly be exaggerated especially when applied to heavy Loams. It renders them more friable,

and flocculates the fine particles of clay, causing them to aggregate into larger lumps, and percolation and aeration are increased. There is also less shrinkage and tendency to cake on drying. So much for the physical side.

"Now we come to the chemical side which is far more important.

"On soils which have a tendency to become sour liming is of the utmost value. It rectifies any acidity present and by so doing it increases the vitality and numbers of the nitrifying bacteria which convert ammonia into nitrates. When organic matter decays it gives rise to various organic acids commonly called 'humic acids.' It has been proved that where this acidity is allowed to accumulate it puts a stop to the life of the Bacteria which induce nitrification and gives rise to the growth of Moulds and Fungi which utilise the plant food for their own benefit and set up a denitrification. I might mention as an example the slime fungus which causes 'Finger & Toe' among the Turnip crops in England and which can be entirely checked by a thorough dressing of lime.

"All land to which nitrogenous manure has been applied year after year, is apt to have a large accumulation of residues, from previous manuring lying dormant on account of wanting a base such as lime wherewith the organic acids can combine. Thus by giving the soil a periodical dressing of lime this manure is recovered and oxidation is once more set in action; nitrates are formed and rendered assimilable to the plant.

"Both Phosphoric Acid and Potash are also rendered more available by the application of lime. For example soil may contain a considerable quantity of phosphoric acid which in the absence of Lime combines with the Iron and Alumina in which form it is very insoluble. On the other hand were lime present it would combine with the Phosphoric Acid in which form it is more available as a plant food.

"The way lime acts with the Potash compounds is equally marked. The soil water being charged with carbonic acid dissolves the lime and carries it down through the soil where it acts upon the double silicates of Potash and Aluminium, Lime being substituted for the Potash and going into solution. The extent of the action of course will depend on the amount of lime present.

"As I said before the soil needs a base for the organic acids to combine with. This is especially so where artificial manures are used and only when the carbonate, hydrate, or oxide of lime is applied can this purpose be effected.

"Periodical liming of soils is necessary because of the gradual removal of the Lime from the surface layers by solution as bicarbonate by means of the carbon dioxide produced by bacteria in decaying organic matter. The analyses of drainage waters show that every soil loses its lime more or less rapidly.

"Lime is also lost by combining with the Nitric Acid produced by bacterial activity to form Nitrate of Lime. This is soluble like other nitrates and is distributed through the soil in the soil water. When not taken up by the growing crop it ultimately finds its way into the drains.

"Again when a fertiliser like Muriate of Potash is added to the soil the Potash becomes fixed in the soil and a corresponding amount of Muriate of Lime is lost in the drainage water.

"These losses explain the need of the periodical liming of soils.

"If we take other compounds of lime like the phosphate, superphosphate, or sulphate of lime they are either acid or neutral and do not supply the required base. I have had the question asked me on one or two

occasions whether by applying Basic Supers or any other combination of lime with phosphoric acid it would obviate the necessity of periodical liming. My answer is emphatically no. There is nothing known at present in Agriculture which would take the place of lime and do the same work so effectively; and until something is discovered to the contrary we must abide by it.

"In Scientific Agriculture lime is classed as an 'indirect fertiliser'—indirect because (1) It is not a plant food in itself (2) It brings about the solubility of more important salts which are direct plant foods and therefore termed 'direct fertilisers,'

"Before I conclude I would like you to clearly understand two important points:—(1) That the action of Lime is partly physical by affecting the texture of the soil. (2) Partly chemical by neutralising acidity, and bringing into action reserves of plant food.

"Planters are usually impatient when they apply lime to see the immediate effect upon the crops. Lime is very slow acting as far as crop is concerned; but on the other hand it is not really so when you come to consider the work which it has to do, a small portion of which I have endeavoured to briefly describe to you.

"To show a real beneficial effect upon crops, lime takes from 1—2 years and even longer, according to the state of the soil to which it is applied. Consequently, those who expect to see the crops benefiting after, say, 2 or 3 months, immediately jump to the conclusion that it has done no good and how often the remark is heard "I see no good effects from liming." The manure applied in the following year is generally a rich nitrogenous one, and when next crop time comes round the remark is heard "I have got a splendid crop this year," and generally if you ask what that is attributed to, the answer is "the Nitrogenous manure applied." The liming that was undertaken in the previous year has been forgotten. In my opinion however most of the increase on former years of that "splendid crop" is due to the beneficial effects of the previous year's liming.

"I ask you, when you apply lime to think what its action is going to be and to show a little more forbearance and not to be in too big a hurry to see the desired effect. In agriculture patience is everything and very often sorely tried.

"In connection with the subject of this paper Planters should read the following articles which have been published in the *Planters' Chronicle*.

"Scientific Officer's Papers, No. 9 in Vol. IV, and No. 99 in Vol. VII.

"The best form in which to apply Lime is Water Slaked Lime. This has a markedly alkaline reaction and hence quickly neutralises any acidity which may exist in the soil. It also acts quickly in liberating plant food particularly Nitrogen.

"The use of Lime which contains a large percentage of Magnesium should be avoided. Magnesium Salts when present in excess may exert a toxic action on plants, and the relative proportion of Calcium and Magnesium determines whether or not Magnesium is toxic.

"Approximate equivalent quantities of some of the common forms of Lime when fairly pure are:—

Quick Lime	...	...	56 lbs.
Water Slaked Lime	...	...	74 lbs.
Air Slaked Lime and Limestone	...	...	100 lbs.

"The Lime should be water slaked and *not* air slaked. In the latter case the Lime combines with the Carbonic Acid gas in the air and forms Carbonate, the condition from which it was originally burned."

TEA.

Fermentation and Micro-Organisms.

The following appeared in the *Englishman* of 19th September, 1912:—

"About a year ago several important publications were issued by the agricultural department in Java. One of them, the most important to tea planters, dealt with fermentation. The author, Dr. Ch. Bernard, in introducing the subject stated that he could not definitely state that his theories had been proved, beyond doubt, to be correct and that his report was preliminary only. He intended to continue investigations, the nature of which he informed his readers. No further publication has since come to my notice but the subject is such an important one and in the event of his theory being proved to be right it will completely upset the ideas supplied by our Science Department through Dr. Mann and accepted by scientifically-minded planters, that a brief synopsis of the article may not perhaps appear out of place. So much occurs in tea to occupy a man's thoughts that it is likely, that the remembrance of Dr. Bernard's theory, pregnant as it is, with possibilities of far-reaching results which besides reducing considerably the time required for manufacture may also influence the quality and flavour of our teas, has faded from the minds of many who gave it no more than a brief passing notice.

THEORIES.

"He commences with a *resume* of the three theories which have, at various times, been advanced regarding the fermentation of tea. They are:—

1. "The chemical theory:—That the fermentation of tea is oxidation pure and simple *i.e.*, the cells having been broken the oxygen of the air combines with the properties in the leaf.

2. "The enzyme theory:—That tea fermentation is caused by a soluble ferment or enzyme which exists in the cells of the leaf and which on being set free during rolling causes the oxidation of the tannin.

3. "The *micro-organism theory*:—That fermentation is caused by soluble enzymes which do not exist in the cells of the leaf but in those of micro-organisms.

DR. H. H. MANN'S THEORY.

"Of these three the enzyme theory is most favoured by experts, and Dr. Mann and other scientists have isolated an enzyme known as an oxydase, (*i.e.*, an enzyme that causes oxidation) from leaf. Dr. Mann demonstrates the great part which this enzyme plays in the manufacture of tea. The quality of the finished article being determined by the percentage of enzyme in the leaf. He also considers it to have some influence on flavour. This enzyme is supposed to exist in the cells of the leaf, and in fermentation causes slight oxidation of the tannin, causing the latter to give up some of its water and to be separated from the sugar with which it was combined. This oxidised tannin has by now assumed a brown colour and combines with the other materials in the leaf and so causes fermentation. He claims to have proved that this oxidising enzyme is the principal and probably the only active agent that causes fermentation, and that living organisms (microbes) take no part in the process, the only microbes present during manufacture being harmful ones, their numbers being determined by the degree of cleanliness of all processes up to the time the leaf enters the drier. He and other investigators advanced the following arguments as

proof that micro-organisms play no part in the fermentation of tea. 1. That leaf in the presence of chloroform fumes which kill living organisms still ferments. 2. The same occurred when an antiseptic substance, known as salicylic acid, was applied. 3. That fermentation takes place so quickly that micro-organisms cannot in such a short time develop to a sufficient extent to take part in fermentation. The first two have since been withdrawn as it was found that in both cases not only the harmful bacteria was destroyed but also the enzyme or whatever soluble or organised ferment was present. The second is but supposition and will be referred to later on.

DR. BERNARD'S THEORY.

"The micro-organism theory brought forward by Dr. Bernard has received at times a certain amount of support from scientists. He claims to have isolated from the micro-organisms always present on tea leaves one which develops during the process of tea manufacture and which causes flavour. He obtained cultures of these by pressing juice from fermented leaf and sterilising. He states that the addition of these cultures to fermenting leaf accelerates fermentation, and that by collecting juice from under the rollers and fermenting for 24 hours, the addition of this juice to fermenting leaf increases the speed of fermentation, and also improves the flavour. In some factories in Java fermentation proceeds much quicker than in others, in some taking 6 or 7 hours whilst in others only half an hour (exclusive of rolling) and in a few the leaf goes direct from roller to drier. Fermented leaf from factories where quick fermentation is the rule, has been placed on the floor of the fermenting room of factories where the process has been taking place slowly—the result being that almost immediately equally rapid fermentation occurred in both factories, caused evidently by a transference of an organism from the leaf to the floor on which it was placed.

DR. BERNARD'S RESULTS.

"The following extract from Dr. Bernard's article shows the results obtained by transferring fermenting leaf from one factory to another:—"At the Malabar concern the time taken for rolled tea-leaf to ferment completely was formerly four hours. Suddenly a change took place and hereafter the finest part of the rolled leaf was not generally put to ferment when it came out of the "ball-breakers," but was put directly into the drier. The coarse leaf was merely fermented for half an hour."

"At the factory Tanara, where formerly some hours were required for fermenting, this process at present takes (after bringing over the fermented leaf from the Malabar concern) just as long and what is better just as short a time at the last-named factory. Also at the Wanasoeka concern very long fermentation took place 6 or 7 hours, Leaf was brought also from Malabar with the same result as at Tanara."

"The number of colonies of this micro-organism is much greater on the leaf of gardens where quick fermentation is the rule than on that of gardens where the progress is slow. Experiments on leaf at all stages from the commencement of withering to the conclusion of manufacture revealed the fact that the micro-organisms are increasing during the whole process. The fact that the micro-organisms increase during the 20 to 30 hours required for manufacture and in the withering process very rapidly would appear to eliminate the objection of want of time for development of the micro-organisms during fermentation.

"With cultures obtained from fermenting leaf harmful bacteria, which leads to the formation of a darker brown, oxidation product of the tannin,

which is completely insoluble in water and whose formation rapidly reduced the colour, pungency and body of the liquor, was also found but only in very small quantities under normal conditions but in over-fermented leaf in much greater numbers. After 24 hours there being more bacteria present than micro-organisms and in eight hours the leaf was in a state of putrefaction. As a result of experiments *re.* the percentage of harmful bacteria Dr. Bernard states that he can say with certainty that by the time fermenting leaf becomes sticky the process has gone too far—that harmful bacteria have had time to do considerable harm.

“On hill gardens a large development of the micro-organisms, consequently quicker fermentation can be obtained by keeping juice for 24 hours and applying it to the rolled leaf of the following day. In the plains, however, tea juice cannot be left for 24 hours without harm.

POSSIBLE RESULTS.

“As to the possibilities of this theory turning out to be correct is a question best left to those with a better understanding of the scientific side of the matter but I think that Planters would be pleased to hear of its undoubted proof. We have no gardens, the leaf of which ferments in such a short time as is apparently the case in some factories in Java but at the same time the time required varies considerably from three to, in some cases, as much as six hours from the time the leaf enters the roller. Rapid development has usually been regarded as a sign of good quality, whilst difficulty in obtaining the colour required has indicated poor quality. Can it possibly be that these micro-organisms of which we at present know little are responsible for quality? Java planters have not up to the present, distinguished themselves as producers of anything approaching first class teas but there may be other factors such as soil, methods of plucking and manufacture which prevent this consummation.

DEDUCTIONS.

“At present the following points as a result of these investigations are worthy of note! firstly, that fermentation must be stopped before the leaf becomes sticky, *i.e.* before harmful bacteria have had time to do much harm; and secondly, that if this theory turned out to be correct, even then the advice so persistently given by Dr. Mann as regards absolute cleanliness in all stages of manufacture in order to keep harmful bacteria in check must be strictly followed. It was found that by taking samples of juice with a damp wad from fermenting trays and floors that had not been kept scrupulously clean that a larger number of harmful bacteria were found than of micro-organisms, showing the necessity for scalding or steaming daily.”

In commenting upon this article the *Indian Planters' Gazette*, points out that the ‘deduction’ is contrary to experience found in practice, and the cleaning and sterilising of Tea factories has been found by several who have tried it to result in low quality tea at once.

COOLIE IMMIGRATION IN CEYLON.

A statement of arrivals and departure of immigrant coolies during the month of August 1912 published by the “Ceylon Observer” for the first eight months of 1912 together with the figures for the corresponding month and period of the previous year; and shows a balance of arrival over departures of 5,538 in 1912. It would be interesting to know if these Immigrants are all from Southern India, but this is not given.

RUBBER.

Thinning out of Rubber Estates.

It may be remembered that an experiment carried out on Periyar Estate on this subject was reported in the *Chronicle*, Vol. VII p. 142, and that the conclusion arrived at was that cutting out every alternate tree is the best method of thinning a thickly planted estate and pollarding is not a success. The following article appeared in the *India Rubber Journal* of September 7th:—

"Quite a large number of estates are now commencing tapping operations, and are therefore in possession of trees four years old and upwards. A large proportion of these areas were planted in 1906, 1907 and 1908 in the respective countries, and the problems now before planters are of a varied character. In Ceylon, where, owing to soil and elevation, the trees were planted closer than in Malaya and Sumatra, some 60,000 acres were planted in 1906 and 50,000 acres in 1907; in fact those were the most active years of rubber planting in that island. Frequent distances at that period were 15 by 15 feet, or 20 by 10 feet; these represent spacings which would be properly described as close planting in Malaya or Sumatra, but they are not necessarily so on poor soil at an elevation of 1,000 feet and over above sea level. It is only when the trees, in Ceylon, reach their sixth or seventh years that thinning out on a large scale is forced upon planters; elsewhere on estates where the same distances have been seen adopted thinning out has been commenced at a much earlier age.

"In Malaya, as in Ceylon, large areas were opened in 1906, 1907 and 1908. In 1906 the acreage was 99,000, in 1907, 179,000, and in 1908 241,000 acres. The distances adopted in those years were a little wider than in Ceylon, popular spacings then being 12 by 24, and 18 by 18 feet. The same applies to Sumatra, except that many of the estates then being under Liberian coffee, a wider distance, especially 20 by 20 feet, was commonly adopted.

ACREAGES REQUIRING THINNING-OUT.

"The broad fact remains that in Ceylon there are about 100,000 acres, and in Malaya and Sumatra a further 200,000 acres which are now covered with trees, the branches and root systems of which are in frequent contact and already competing with one another for light and soil. During the next year or so the problem of thinning-out must be faced: otherwise there will be a gradual reduction in yield of rubber consistent with a slower rate of growth of the whole plant and poorer bark renewal.

"The problem can be easily settled by those parties who would simply reduce the number of trees by half; but such a policy would, on many estates, be unscientific and extremely wasteful. Thinning-out must be taken in hand only after the fullest consideration has been given to distances, soil, climate, diseases, storms, past tapping, manuring and general methods of cultivation. We will therefore study the methods generally adopted and the importance of some of these factors.

METHODS NOW ADOPTED.

"Let us first admit that thinning-out must be done now or in the near future. Where thinning-out is resorted to on young areas the plants can be easily uprooted and destroyed, since the quantity of rubber obtainable from the stumps (or first eight feet) does not come into serious consideration. This is by far the most preferable course, and should in Malaya and Sumatra be done when the trees are about three years, and in Ceylon when

they are about one year older. At the ages indicated the remaining trees can usually be expected to give a fair cover to the ground and to rapidly throw their roots into soil set free during the thinning-out process.

"On old estates the quantity of rubber obtainable from the stumps of trees being thinned-out is quite considerable, and immediate uprooting and destruction is therefore not generally deemed advisable.

"On both young and old estates, and especially the latter, there are two methods available. The first is by cutting out all the trees in every alternate row; the second by removing only the backward trees. The first method is the easiest, most drastic, and most heart-breaking; it is based on the idea that in thinning-out half the trees must be removed. If an estate were closely planted and showed very even growth it would be perfectly justifiable; if the reverse conditions prevailed, then it is quite conceivable that complete good rows may be removed and bad ones retained, or that those lines of trees removed might possess the best trees on the estate, and those retained the worst on the property. Where the estate is not even, or where there is liability to death by various causes, thinning-out by the second method—removal of backward trees—seems to be the most sensible one to adopt,

HOW MANY TREES PER ACRE.

"But even this policy has its limits. It is quite obvious that there is a minimum number of trees per acre to be kept in view. And he is a very wise man who can hit off that number. Our view would be to ultimately thin-out down to about eighty or ninety trees per acre; this would naturally be still further reduced from year to year through diseases, storms, bad tapping, etc. Diseases would be the most potent factor in effecting reduction later on, the thinning-out process being of such a nature as to encourage the spread of fomes and white ants. On an estate known to the writer the deaths amount to from 5 to 7 per cent. per annum; the percentage common to young estates would probably be maintained or exceeded in the first two or three years following thinning-out.

"While it is hardly fair to expect planters and experts to maintain the same views for all time, we certainly feel justified in giving publicity to the opinions expressed by such men as Malcolm Cumming, Francis Pears, and Gallagher.

"Cumming believed that close-planting would, during the first few years, give more rubber per acre than wide-planting.

"The late Francis Pears states that "an acre of rubber with 50 trees is likely to prove more valuable than one with 200." It will also be remembered that Wickham advised 40 trees per acre as against Berkhout's 300.

"Gallagher estimated that on virgin jungle (and from 15 to 20 per cent. of the trees originally planted would be lost by the time the trees were seven years old. He recommended commencing with 120 to 140 trees per acre, in order that about 100 trees per acre might remain at seven years.

MANURING AND THINNING-OUT.

"While every planter must now admit that close planting checks the growth after the fourth or fifth year, on fairly good soil, and that the original cannot be the final distance on estates planted only with Hevea trees, we doubt whether the actual value of manuring has been taken into full consideration. It has a direct bearing on the age at which Hevea estates should be thinned. There are many estates which, being closely-planted and

therefore renewing their bark slowly, could be assisted by the application of manure. On many estates which have been too severely tapped the application of manure has been followed with a more rapid bark renewal; on close-planted estates a similar effect should be obtained. In such cases it would be advisable only to manure those trees intended to permanently occupy the land. Again, one might support a larger number of trees, per acre, by proper manuring.

HOW THINNING-OUT IS DONE.

"When we come to the actual thinning-out process we find that either the plants are felled near the ground and the stump and roots extracted, or the tree is cut off at a height of about eight feet. Where the basal part of the trunk is retained it is customary to tap this drastically and finally uproot. In one or two years a few pounds of rubber are obtained from each stump. Special gangs of inferior tapping coolies are usually entrusted with such work, it being desirable to employ only the best coolies for tapping the permanent trees. The writer has seen many stumps treated in this way and has been struck with their manifestations of vitality under such adverse circumstances; even though the stumps are densely shaded by the foliage of the surrounding trees, they may throw out numerous branches at the top, which, if allowed to grow, would probably give the plants another lease of life. If, however, thinning-out is to be done properly all such stumps must be uprooted, all roots removed, and every particle burnt immediately. It is true that by allowing stumps to retain branches the plants are kept alive and the risk from disease for the time being postponed; sooner or later all traces of the trees so treated must be removed and destroyed.

This article was submitted to a number of leading directors and planters and their comments are given in the *Journal*.

Most of the commentators appear to agree that the number of trees to be finally aimed at is 90 to 100 per acre or even less. Another recommendation given by several men is to only cut out alternate trees or lines of trees if the growth is even. Where it is uneven selection should be adopted cutting out backward trees first and then those diseased or with burrs. Again most planters appear to agree that uprooting and burning should be done though all are not agreed about the value of pollarding and tapping the stumps to death first. Mr. E. G. Windle says he would begin by taking out backward trees and then by judicious selection. It is evident that on this system the lining could not be kept to but this does not much matter. "As to the average number of permanent trees per acre to be aimed at" says Mr. Windle "I would put this at 50 and would aim at arriving at this number when the plantation was say 12 years old commencing thinning at 6 to 6½ years. This would only mean a reduction per acre of 10 per cent. per annum. The above may appear too slow a process from the point of view of the best development of the trees, but is, I think, a reasonable compromise between development and dividends.

THE BRITISH NITRATE SUPPLY.

Dr Samuel Edy of Christiania gave an address before the International Congress on the "Artificial Production of Nitrogen from the Atmosphere." In his remarks Dr. Edy said "with all his strength in the event of war, Great Britain can be put out of Commission by simply cutting off the supply of Nitrates (essential impiedient for explosive) from Chile. — *Times Weekly Edition*.

The Planters' Chronicle.

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(INCORPORATED.)

Scientific Officer's Papers.

CIX.—PREVENTION OF THE INTRODUCTION OF INSECT PESTS AND FUNGOID DISEASES OF PLANTS.

[*Concluded.*]

The last phase of the general problem is how to stamp out diseases when they have been confined to certain districts, and this is the most difficult of all. It is here that the Pest Act proper comes into operation. Pest Acts exist in many countries for dealing with specific diseases and bad weeds. Thus in Trinidad and Grenada laws are in force to provide for the control of pests and diseases within the island. In Bermuda an Act was introduced in 1907 requiring the destruction of all fruit in the island for two seasons in order to bring the Fruit Fly (*Ceratitis capitata*) under control. In England under the Board of Agriculture's orders compulsory pruning of Gooseberry bushes in Kent has been enforced and compulsory spraying of fruit to deal with the American mildew which made its appearance some three years ago. Compulsory uprooting and destruction of plants is not insisted upon, but many growers have voluntarily grubbed out infected fields. This shows the trend of such legislation. It does not necessarily resort to such drastic measures as was suggested at the Annual Meeting this year, and an estate is not uprooted and burned, but reasonable methods of a curative and protective nature recommended by the Agricultural authorities are insisted upon.

Any Pest Act introduced into India would probably follow the same lines and would depend for its success largely upon co-operative and voluntary action of the planters concerned for the ultimate good of the whole planting community.

The Green Bug in the Nilgiris is usually taken as the standard case. A Pest Act introduced to deal with this would probably insist upon spraying or washing methods being adopted on every estate suffering from the disease, and would not allow the total abandonment of diseased coffee to act as nurseries and infection points for the spread of the disease. Only estates which refused to adopt any preventive or curative measures would be compelled to uproot and destroy the diseased plants.

The difficulties would be many as is only natural. One great difficulty is the fact that the Green Bug is present on the shade trees and also on many of the jungle trees and that many estates are in boundary over long distances with Government forest. Here the co-operation of the Forest

Department would be needed and it is possible that where estates were in boundary with forest, belts might be felled and planted with some tree which is not attacked by Green Bug and is of value as a timber and these belts kept as free as possible from weeds. The estate boundaries could then be sprayed and watched.

The working of a Pest Act necessarily entails expense both on the part of the Government introducing it and on the planters, and it needs sensible co-operation between both parties. The point to be decided is whether the value of the industry it is aimed to protect is worth the expense and the temporary hardships to be incurred, and it is reasonable to suppose that both are temporary and that the Pest Act if properly worked will eradicate the disease and thus finally benefit the country and the community monetarily.

A Pest Act is in existence already in India in the progressive State of Travancore where it is aimed at stamping out the Cocoanut Palm disease which threatens to destroy a most important industry. The following account of this Act, which is really a voluntary co-operative measure between the Government and the planters, is taken from the *Madras Mail* (July 12 1910) and it affords an excellent example of a voluntary co-operative measure between the Government and the planting community which might well be followed in other parts of India.

"The Government of Travancore have issued an order regarding the palm disease in Travancore, with special reference to the Conference held at Kayankulam on May 6th last, with a view to determine the best measures to be adopted for combating the disease, from which we take the following extracts.

"In view of the preparedness of the ryots generally for further action, and the recognition by them of the necessity to cut down, without further delay, diseased trees which are pronounced irrecoverable by the Agricultural Department, His Highness's Government think that vigorous action may now be taken to cut down all such trees. In regard to the supply of lime and cocoanut manure, His Highness's Government are of opinion that it would be well to establish a number of Depôts at accessible places, not more than one or two miles away from one another. The Agricultural Department should be in charge of the Depôts and should issue the various things at cost price and for cash ordinarily. Discretion may, however, be given to the Inspector in charge of the operations, to issue the things in any specific case, on credit, provided that the officer is satisfied that the ryot is not in a position to pay cash, and provided also that the latter agrees to pay for what he receives in instalments, not exceeding six, with his kist. The collection of the value should, in that case be made by the Tahsildar and remitted to the Agricultural Department. The prices fixed for the things supplied should, if possible, be slightly lower than the market rates, so as to offer a premium for utilising the manures.

"In regard to the assessment on the trees which may be cut down, His Highness's Government hereby notify, for the information of all the ryots that, after all the felling is done, it is open to any ryot to ask for a re-enumeration and that the settlement assessment will be revised if necessary. His Highness's Government also consider that the local staff of the Department should be sufficiently strengthened, so as to make visits to affected gardens and gratuitous advice easy. Much will depend upon the readiness with which the officers of the Agricultural Department comply with the requisitions for advice, for visits and for manures. A small area should

be given to each subordinate, so that it may be ascertained, after some time, what exactly he has been able to do.

"His Highness's Government further consider that it would facilitate work if small Local Committees are organised to help the Agricultural Department in securing information and the co-operation of the ryots, and for acting generally as intermediaries between the Department and the ryots. The local committees should, when formed, be in a position to give useful advice in regard to the circumstances of applicants for manure, who may ask for credit, etc. A strong local committee will probably also be able to bring more pressure to bear upon a recalcitrant owner of hopelessly diseased trees than the Sirkar officers could. The local committee should be elected by the ryots themselves. The Department need only recognise them and utilise them. At the outset it may probably be necessary for the Tahsildar to co-operate with the Director of Agriculture and convene a meeting of the ryots in an informal way to organise the Committees. The Dewan Peishkar, Quilon, is requested to pay his personal attention to this matter. He should submit a report to Government as soon as each Committee is organised, with information as to the names and status of the members."

"Certain proposals submitted by Dr. Kunjen Pillay, Director of Agriculture, in connection with the above have been sanctioned for a year, with effect from the 1st. Karkadagom, 1085. A lump sum of Rs. 8,000 has also been provided in the Budget for 1086, on account of the pay of the temporary staff now sanctioned, the cost of erecting the necessary sheds and for other contingent charges. In regard to the advance of Rs.10,000 asked for by the Director, the Account Officer is to be requested to provide under "Debt heads" a sum of Rs.2,000 for the rest of 1085, and Rs.8,000 for 1086."

RUDOLPH D. ANSTEAD.

Planting Expert.

CHEMICAL WORKS IN BOMBAY.

Bombay is on the eve of an important industrial development. A scheme is being pushed forward for the establishment of large chemical works for the manufacture from sulphuric acid of a large number of products dependent on this acid. The intention is to take the raw materials of the country, which are now being exported or not used at all, and convert them into fertilisers or chemical products used by the textile trades of Bombay. H. E. Sir George Clarke, who recently referred in a speech to the advantages of chemical fertilisers, is taking a great interest in the scheme. It is altogether a new development for Bombay but it will not be the first large heavy chemical industry that has been established in India, for Messrs. D. Waldie and Co.'s chemical works, in Bengal, have been in existence for very many years. The advantages to Bombay will be the production of cheaper chemicals for the textile trade and the manufacture of fertilisers. The raw materials will be obtained from Bombay and other districts. There is an enormous field for chemical fertilisers in India as farmers will realise when they are educated on these points. Ceylon, Java, Japan and China are already large consumers of chemical fertilisers and appreciate their value. Mr. H. N. Morris, Chairman, Chemical Factories at Manchester and Cheshire, who has been in Bombay for several months making arrangements for the erection of a chemical fertiliser factor, is returning to England, but will return in February or March, when the new works are expected to be ready to start,—(*Indian Planter Gazette*).

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Bees and Coffee Fertilisation.—At the Annual Meeting it was decided to remind the Government of Madras of their promise to allow the Government Entomologist to investigate this matter. It appears, however, that it had not been forgotten and Mr. T. Bainbrigge-Fletcher has now made arrangements to pay a preliminary visit to the Shevaroyes. He arrived there on the 14th October, and will get an idea of the local conditions and make plans for any necessary experiments. As the Coffee is in blossom for such a short time a plan of action must be decided upon sometime beforehand. It is hoped that Mr. Fletcher will pay a similar visit to some Mysore estates at the beginning of next month. In connection with this subject the following extract from *Nature* of 19th September is of interest:—

“Mr. Cecil H. Hooper has contributed to *Irish Gardening* for June and July an account of some interesting experiments on the pollination of hardy fruits, made by himself, Mr. F. Chittenden, and others. These experiments were made in order to ascertain whether fruits can set and mature without the aid of bees, whether mature fruit can be obtained by pollination with the pollen of the same variety or the same flower, and whether better fruits result from pollination with pollen of another variety. It was found that gooseberries and currants, raspberries and loganberries, though freely self-fertile, set better fruit when visited by bees; that strawberries are apparently to some extent wind-pollinated, though this needs confirmation. As is well known, more or less complete self-sterility is common among the many varieties of cherry, plum, apple, and pear; in the majority of cases pollen from another variety is essential for fruit formation. Details are given of numerous interesting results obtained by covering otherwise untouched flowers with muslin bags, by brushing with pollen from the flower's own anthers, or from those of other plants of the same variety, and by pollination with pollen from other varieties. In connection with the interplanting of different varieties in orchards, lists are given according to the times of flowering. The author estimates that about 80% of the pollination of hardy fruits is done by the hive bee, about 15 per cent. by the various humble bees, and the remainder by miscellaneous insects.”

Scientific Assistant for Coorg.—Mr. L. G. Jonas, who has been appointed Scientific Assistant for Coorg, sailed in s.s. *Simla* on 28th September and will come direct to Madras, where he is due on 26th October. A meeting is being arranged at Mercara on 7th November to meet and welcome Mr. Jonas, and the Scientific Officer will probably accompany him and formally introduce him to the Coorg planters and his district. Mr. Jonas has been undertaking a special course of study in England during the last three or four months to specially fit him for his work in Coorg. He has been studying Fungi with Mr. Massee at Kew, and has also spent some time at Rothamsted, as well as working at practical agricultural chemistry in a London laboratory. He has also been enquiring into the subject of the quality of coffee in the London market and is bringing out a specially put up series of samples of all the different grades.

Scientific Assistant for Mysore.—The Scientific Officer and Mr. Frattini will meet the Council of the Mysore Planters' Association at Chickmagalur on 22nd October to discuss and arrange a programme of work for the Assistant over a period of the next twelve months. It has been arranged that Mr. Frattini should occupy the bungalow at Goorghully, near Saklasapur which has been lent by Mr. Hayward. This bungalow is in a healthy situation out in open grass land, with the estate close at hand. It is within easy reach of Mudigere, Saklasapur, and Belur, and about 20 miles from Chikmagalur across country.—R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

Coorg Planters' Association.

Minutes of a General Meeting held in the Bamboo Club, Pollibetta, on Thursday October 3rd, 1912.

PRESENT.—Messrs. Maclean, Hume, Shaw, Breithaupt, Mahon, Tweedie, Graham, Garrett, J. W. Finlayson, A.B., Chengappah, Gerrard, Hamilton, Bracken, Tipping, A. Bopannah, and W. M. Ball, Honorary Secretary.

The Honorary Secretary in the Chair.

Government of Coorg.—Mr. Jackson, in opening the subject read his letter to the Honorary Secretary bringing to his notice the fact that there was an agitation on foot to ask to have Coorg placed under the Madras Government and pointed out the many disadvantages Planters and the Province as a whole would be under should Coorg become a small Collectorate of Madras, and proposed the following Resolution which was seconded by Mr. Graham and carried *nem. con.*

“That in the event of there being any proposal to place Coorg under the Madras Government this Association trusts that nothing would be done in the matter until it has had an opportunity of placing its views before the Government of India.

“It was also resolved that a Sub-Committee be appointed to draw up a letter to be circulated among the leading residents both Coorg Indian and European stating the case of the Association and asking their support against any such scheme. The Sub-Committee to consist of Messrs. A. H. Jackson, A. Bopannah and the Honorary Secretary.

The Visit of H. H. The Maharajah of Mysore.—The Honorary Secretary pointed out that H. H. was expected to visit Coorg, as the guest of Sir Hugh Daly, K.C.I.E., C.S.I., about the 3rd or 5th of November. On the motion of Mr. C. G. Maclean it was resolved that a deputation consisting of the President, the Hon. Secretary, Messrs. Graham, Jackson, Mahon and A. Bopannah do call on H. H. the Maharajah and welcome him to Coorg on the part of the Association.

U. P. A. S. I. Meeting.—The Honorary Secretary explained that no report had been drawn up by the delegates as the proceedings were so fully reported in the *Madras Mail* and the *Planters' Chronicle* but that their delegates were now present and would be pleased to answer any questions. He also reminded the Members that one of their delegates had been elected Vice-Chairman of the U. P. A. S. I. and called for a vote of congratulation to Mr. Mahon on his election. This was most cordially given and Mr. Mahon briefly replied in acknowledgment.

The Honorary Secretary reported that through the kindness of Sir Hugh Daly, the Chief Commissioner, they had the opportunity of meeting Mr. W. H. Wood Senior Member of the Railway Board and pressing the claims of Coorg to a Railway. Mr. E. A. S. Bell, Engineer in Chief, Mysore State Railway Construction Department, was also present. Mr. Wood gave the delegates a sympathetic hearing but said it would be necessary for them to bring up a practical scheme for financing any proposed Railway.

Mr. Jackson asked about the working of the Planters' Benevolent Fund and the Honorary Secretary explained things as far as he knew and promised to write to the Secretary, U.P.A.S.I., and ask if any report had been published. After a short discussion on other matters Mr. C. G. Maclean proposed a hearty vote of thanks to the delegates for all the trouble they had taken, this was seconded by Mr. Bracken and carried *nem-con.*

Labour.—The Honorary Secretary called the attention of the meeting to Mr. Barber's scheme for the registration of maistries and referred members to that week's *Chronicle* for an explanation of the same and asked them to bear in mind that their delegates to the next Meeting of the U. P. A. S. I. would require instructions on the subject. Mr. Mahon briefly explained what the Sub-Committee of the U. P. A. S. I. of which he was a Member, had to do, and though there was such difference of opinion the meeting on the whole was in favour of an attempt being made to devise the workable scheme. In consequence of a resolution passed at a meeting of the Committee the Honorary Secretary brought up the subject of the rates paid for daily labour. After a long discussion Mr. Graham proposed that the Honorary Secretary do write to all Members asking them what rates they paid to coolies on the Check Rolls. In moving the Resolution, Mr. Graham explained that he only did it to prevent coolies circulating exaggerated reports in the Bazaars. The resolution was seconded by Mr. Tweedie and carried.

Letter from the District Magistrate was read regarding the extension of time in which a warrant would be granted. Resolved that the letter be printed and circulated amongst Members. Mr. Maclean complained that under a new ruling the Subedars were now refusing to grant hand warrants. Mr. A. B. Chengappa proposed and Mr. Mahon seconded that the District Magistrate be asked to rule that the Manager of the Estate be a valid witness to thumb impressions of Kurumbers and Yeravars. Resolved that the Honorary Secretary do call the attention of the District Magistrate to both the above matters.

General.—Read letter from the Commissioner *re* the Cannanore Ghat Road dated 9th August. Many members complained that the road was still in a very bad state. Resolved that the Honorary Secretary do again write to the Commissioner on the matter and ask him to point out to the Executive Engineer how necessary it was that this, one of the few outlets from the Province, should be put in good order before the crop season, now approaching, commenced.

Mr. Tweedie proposed and Mr. Mahon seconded that the local Government be addressed on the subject of the speed of Motor Cars and suggest that a speed limit be enforced where necessary especially on the Ghats. —Carried.

Read letter from the Director of Telegraphs, Madras, *re* alteration of hours at the Pollibetta combined Office.

Read letter from Mr. Anstead, Planting Expert *re* a visit to Coorg of Mr. T. Bainbrigge-Fletcher, Madras Government Entomologist. Resolved that this Association will be very pleased to see Mr. Bainbrigge-Fletcher and a tour will be arranged for on receiving the dates of his proposed visit.

Read letter from Mr. A. B. Chengappa *re* the concession of 10 acres free of assessment to bane landholders. From Mr. Graham *re* payment of Police for escort to money coolies. These matters to be enquired into by the Honorary Secretary.

District Fund Board.—Mr. A. H. Jackson explained what had been done about the Kerala Road Bridge and also about the Pollibetta-Sidapur Road which project appears unfortunately to be at a stand-still owing to a difference of opinion as to the right trace. Mr. Mahon proposed and Mr. Tipping seconded a vote of thanks to Mr. Jackson for all the trouble he had taken in the matter.

With a very hearty vote of thanks to the Chairman the meeting closed.

(Signed) W. M. BALL, *Hon. Secy., S. P. A.*

Malabar Coast Planters' Association.

Proceedings at the Half Yearly Meeting held at the Malabar Club, Calicut, on 14th September, 1912.

PRESENT.—Messrs. E. Lord (Chairman), T. Martin, V. H. Travers Drapes, Campbell Hunt, H. C. Plowden (Hon. Secretary). *Visitors:* Messrs. W. O. Wright and G. Dunning.

The Notice Calling the Meeting having been read, *the Minutes of last Meeting* were taken as read.

The Chairman on opening the Meeting said.—"I very much regret to see such a poor attendance; this is the first meeting held under the resolution passed at the last General Meeting limiting meetings to two a year instead of quarterly as before and I was in hopes that we should have had a good representative attendance. Owing to the Estates comprising this Association being so scattered, a certain amount of trouble and loss of time is no doubt occasioned in attending meetings, and some members may not consider the meetings worth it but unless members are prepared to go to a little trouble and meetings are well attended all interest in the Association is likely to be lost, and the Association fall through. This would I think be a mistake, as a combined body would carry more weight than an individual if the time ever comes when any serious question arises, at present luckily very few of us have any grievances, but we never know when they may turn up.

"I do not intend to waste your valuable time with any further remarks. Various subjects will come up in due course and we shall then have an opportunity for discussing them."

Roads and Communications.—Read letter to Executive Engineer, *re.* bad condition of Alwaye Thattakad, and Muvatupuzah Thodupuzah roads. Mr. Lord mentioned that the matter had received the immediate attention of the Travancore Government, and the roads were now in good order. Recorded with satisfaction.

Mr. Campbell Hunt drew attention to the bad state of certain roads in Malabar and proposed the following resolution which was seconded by Mr. Travers Drapes. "That the Honorary Secretary be requested to write to the President, Malabar District Board, Calicut, pointing out the bad state of road No. 114 especially from the 7th to the 12th mile stones and to the fords across two rivers on this road."—Carried.

After some discussion the Meeting was of opinion that it might be feasible to employ Government Motor lorries where several estates were grouped together provided that the rate charged did not exceed the present cart rate which is about 4 annas per ton mile, the question of roads and bridges would have to be gone into before anything could be decided. The Honorary Secretary was requested to inform the Secretary of the U. P. A. of the opinion of this Association.

U. P. A. S. I. Delegate's Report.—This was read and discussed. The Chairman proposed a vote of thanks to Mr. Plowden for the trouble he had taken in representing the Association at the abovementioned Meeting.—*Carried nem con.*

Refund of Rubber Exhibition Money.—Proposed by Mr. Martin and seconded by Mr. Travers Drapes that the Rubber Exhibition refund of Rs.332-8-0 be placed to the general fund of the Association.

Finance.—Proposed from the chair, that the financial year of this Association be from the 1st January to 31st December.—Carried.

The Chairman said our Delegate to the U. P. A. S. I. has informed us that increased subscription is not required. Our present cess of one and a half annas per acre is sufficient to meet the expenses of this Association for the year.

Supply of Bulletins.—The question of supplying bulletins was discussed and the following resolution was passed proposed by Mr. Plowden and seconded by Mr. Campbell Hunt: "That this Association provide bulletins to Estate Managers and that the cost of them be charged to the general fund."

Lady Amptill Nursing Institute.—It was pointed out by Mr. Lord that this Association did not subscribe to the Institute as an Association, but that private subscriptions were collected from members and remitted to the Honorary Secretary of the Institute, and that as under this method subscriptions had fallen from Rs.155 in 1910 to Rs.60 in 1911 and so far no subscriptions had been received this year, the institute was not getting the support it deserved. The Chairman then proposed the following resolution: "That this Association do join the Lady Amptill Nursing Institute and pay an annual subscription of Rs.100 and that the Honorary Secretary be requested to write to the Honorary Secretary of the Lady Amptill Nursing Institute asking that the Association be allowed to become a subscriber as from the 1st October on payment of a proportionate amount of the yearly subscription."—Carried.

Annual General Meeting.—Proposed by Mr. Campbell Hunt and seconded by Mr. Travers Drapes: "That the Annual Meeting of the Malabar Coast Planters' be held in February.—Carried."

Election of Planting Member of Council.—Resolved that this Association support Mr. Barber and that members be asked to vote for him.

After a hearty vote of thanks to the Chair and to the Honorary Secretary of the Malabar Club the Meeting closed.

(Signed) EDWARD LORD,
Chairman.

(„) H. C. PLOWDEN,
Honorary Secretary.

Up to the end of 1911 the capital sunk in rubber in the Malay Peninsula is given as £21,000,000 for sterling companies and £24,000,000 for dollar companies. The addition of Ceylon, Java and other companies brings the total to £77,917,000. This may be taken as a conservative figure including only actual planting capital and not Continental and American flotations. The area under rubber in Malaya is estimated at 540,000 acres, while 800,000 acres are alienated but not yet planted up. Some useful tables in an appendix afford further comparisons of the advance of the industry. In 1905 the acreage under rubber was 38,000 acres. The increase each year varied from 47,000 to 70,000 acres until 1911, when an increase of 180,000 acres took place, the number of estates having risen from 254 in 1906 to 964, and the total area planted to 542,900 acres. The number of estate labourers at the end of 1911 was 227,985, of which 126,665 were Tamils.

—Commerce.

RUBBER.

Synthetic Rubber.

Now that the controversy aroused by Professor Perkins' announcement shows signs of abating perhaps a brief resumé of the facts and opinions disclosed may not be without interest to the readers into whose hands this publication may be expected to fall.

The history of the subject dates back to 1860, when Greville Williams obtained from the products of the destructive distillation of rubber a product he termed isoprene, and observed moreover that this substance when heated with acids was partially re-changed into something resembling rubber in appearance.

The next explorer in this field was Bouchardet (1875) who obtained other products by heating caoutchouc, such as di-isoprene, etc., together with isoprene and came to the conclusion that they, and rubber itself, are polymers of isoprene, that is are primarily derived by the condensing or combining together of numbers of molecules of isoprene. The same worker also drew attention to the similarity of his di-isoprene to turpentine, a remark of great significance as subsequent events showed.

These researches paved the way for the noteworthy advance made by Sir William Tilden in 1884, who succeeded in preparing isoprene from turpentine—its first production from a substance other than rubber itself—and definitely foreshadowed the possibility of the commercial manufacture of the latter substance. He was not much more successful at the time than his predecessors in attempts to condense the isoprene but, eight years later, on examining the bottles in which it had been stored, found in them a substance having all the properties of natural rubber and like it capable of being vulcanized.

Little further progress however was made until several years ago, when the rapid increase in the price of the natural article began to direct the attention of chemists to the problem of its artificial production. Almost simultaneously apparently the question was taken up by Professor W. H. Perkin and by Messrs. Strange and Graham's chemists, under Dr. F. E. Matthews, in England, and by Bayer & Co., the Badische Anilin and Soda Fabrik, and Messrs. Sohering in Germany.

Isoprene naturally was the pivot on which the first experiments were based, to discover, if possible, a method by which it could be readily turned into rubber. The Bayer Co., after innumerable trials decided that heat was the most favourable reagent for effecting the change, and patented a process giving results fair but much inferior to the method shortly afterwards hit upon by the English chemists. In July 1910 it occurred to Dr. Matthews to study the action of sodium upon isoprene, so placing together these two substances in a tube he sealed it up and went away for a summer holiday. During his absence the isoprene, grateful perhaps for a respite from the violent treatments to which it had been so long subjected, allowed itself to become condensed to rubber, and the first important stage of the attack was accomplished.

The production of isoprene now became the dominating subject. First thoughts of course centred on turpentine, from which it had previously been obtained by Tilden, as a raw material. Further consideration however soon put this out of court, on account of the limited supply, of the wide fluctuations in price, and of the indifferent yields obtainable from it.

Any substance to be practicable as a raw material for rubber must be cheap and obtainable in enormous quantities, and must furthermore offer the possibility of production of the finished product at not more than 1/ per pound. Regarded from this stand-point the only substances worthy of consideration seemed to be coal, petroleum and starch.

From coal of course is produced coal tar, that universal provider to the organic chemical manufacturing industry, but this did not appeal to the English chemists as a likely starting out point. Their German rivals on the other hand, with greater fidelity, selected tar to work from and are now obtaining isoprene from it though in what quantities and with what degree of readiness has not been made public.

Petroleum was next considered and numerous experiments made with it but not with promising results.

There remained now only starch, and this being cheaply convertible by fermentation into lactic acid this line of research was investigated, with the result that although with great ingenuity a way of converting lactic acid into isoprene was discovered yet the series of reactions by which it is accomplished is so complicated as to be utterly impracticable as a commercial proposition.

How else then could starch be turned to service? It can readily be changed into sugar, as is generally known, and this in its turn can be fermented and give rise to various products, the chief and best known of which is alcohol, and amongst them being fusel oil—a mixture of "higher" alcohols.

Now these higher alcohols, for various chemical reasons, seemed to form a promising base for further advance, and also it did not seem unlikely that improved means for obtaining them could be devised. So it proved. Taking for instance one of the amyl alcohols, $(\text{CH}_3)_2\text{CH}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH}$, it was converted by the action of Hydrochloric acid into amyl chloride, $(\text{CH}_3)_2\text{CH}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{Cl}$, this by treatment with chlorine into a dichloride, $(\text{CH}_3)_2\text{CH}-\text{CHCl}-\text{CH}_2-\text{Cl}$, which when passed through a heated tube containing sodalime gave the hoped-for isoprene $\begin{matrix} \text{CH}_2 \\ \text{CH}_3 \end{matrix} = \text{C} \cdot \text{CH} = \text{CH}_2$.

On these results a bacteriologist, Professor Fernbach, of the Pasteur Institute, was invited to join the group with a view to improving the means by which fusel oil is obtained, and after 18 months work his efforts in the discovery of new fermentation processes, affording a cheap method of obtaining acetone, a substance of great importance to the explosive and other industries, and of butyl alcohol, which when treated in the way described above affords butadiene and butadiene rubber. The isoprene yielding alcohol has apparently not yet been obtained in quantity, and work in this direction is proceeding.

From the yield as since given for each stage of the process it would appear that the resultant one, of rubber from potato, the source of starch, is not more than 8%, from which it may be calculated that to displace one acre of land under rubber cultivation nearly half an acre under potato would be required—of the high priced lands of Europe presumably. Hardly a satisfactory economic basis for the new industry to rest on one would think.

Such is an outline of the story detailed by Professor Perkin and the time having arrived when work on a larger scale became necessary, an appeal for funds had to be made, conditions in the British chemical industry being such, that no capital is available for experimental work.

The proposition, although based on all appearances sound prospects of being able to supply the world's demand for both acetone and fusel oil, seems to have met with less support than one, say, for growing rubber in the Sahara would be expected to receive.

Criticism, directed mainly towards the slaying of the project, and ignoring that the question of rubber manufacture was declaredly only in an experimental stage, was focussed on the points that the process described was for butadiene—not isoprene-rubber, that only insignificant quantities had been made and vulcanisation experiments carried out, that no information given justified the estimate of 1/ per lb. as the probable cost of production, and that in any case no synthetic rubber could be expected on the market for some years to come.

True though all this may be it must not be supposed that the matter is disposed of even if the English group does fail to obtain the requisite funds. It is evident from the numerous patents being taken out that great activity on the subject prevails in the German laboratories, and that the main efforts of the Bayer & Co.,—with its 300 trained chemists—and of the Badische Fabrik, of indigo fame, are directed to the overcoming of the difficulties that at present stand in the way of rubber manufacture.

Professor H. E. Armstrong, writing in the *Times* of July 17, emphasises this, and deprecates the excessive jubilation of the English chemists. He points out that it is doubtful whether the fermentation processes can be adequately protected by patents, that probably agents other than sodium will be found to effect the polymerisation of isoprene, and that in fact there is reason to believe that the German firms even now have at their disposal information that renders them independent of the Perkin group. When they obtain a satisfactory process it will be a small matter, considering the enormous fund of technical experience they possess and the capital at their command—the Badische Fabrik laid down one million sterling in the developing of the indigo synthesis—to organise a manufacturing industry on a huge scale.

An eminently sane article is concluded "It is of the utmost importance that the production of natural rubber should be made a scientific industry. In the case of indigo the margin in favour of the artificially made material is not so very great; had the planters taken time by the forelock it is not improbable that they would have held their own. It will be well if rubber planters take the lesson of indigo to heart and learn without delay to set and keep their house in perfect order."

Nothing sounder than this can be said on the subject. Synthetic rubber's most vulnerable point will undoubtedly be in its mechanical properties after vulcanisation. It will be to high class natural rubber as is shoddy to silk,—but it will be necessary to be able to demonstrate clearly and decidedly from the beginning that it is shoddy.

Present methods of valuation will not suffice, methods by which rubbers differing widely in their practical qualities fetch the same price, by which "crepe" for instance sells for more than the certainly superior "smoked sheet." As long as "prettiness" continues to be the chief criterion there is little reason why synthetic should not enter the market on equal terms with natural rubber.

Buying then must be made on the basis of the mechanical tests afforded after vulcanisation—reliable means of valuing raw rubber having as yet been devised—and, as trade conditions prevent the buyer from

undertaking these, they must be furnished by the seller. Either actual figures could be given with the consignment or a guarantee that it complies with standard tests.

This would constitute one step—a momentous one—in the scientific organisation of the industry advocated by Professor Armstrong.

But there are others—no less important. As yet the number of scientific workers engaged on the many problems that require attention can be counted almost on the fingers of one hand. Worse still, none knows what his fellow-workers are doing. At any time it may happen that two or more are carrying out independently the same work, halving at least the potential capacity for progress.

Surely this is a lamentable waste, the labourers being so few. The production of a uniform product of the highest attainable quality, is the ideal to be aimed at, and this can only be reached by patient and laborious experiment and by adopting the principle that knowledge gained and progress made must be thrown into the common stock.

Laudable as may be the ambition of each of the hundreds of estates to make a name for its own particular brand, the futility of the endeavour must be obvious. Which buyer would care to know what *seringueiro* made the Pará he is purchasing?; and what estate gets a farthing more for its rubber because its neighbour is less successful.

Certain it is that were first plantation rubber of one quality, and that the best, there would not be the difference that prevails to-day between its price and that of "fine hard Pará" (equivalent to about 9d per lb.) To those who assert that "plantation" will always be able to undersell "synthetic" let us admit the fact, but point out that a decrease of 1d. per lb. in selling price means, or soon will mean, a loss of £300,000 a year to the industry, and that to have to resort to underselling would involve the throwing away of millions.

It is of the utmost importance therefore that the advent of "synthetic" on the market should be prevented if possible from bringing about *any* fall in price.

From this point of view then it is of urgent necessity that a policy of taking no risks be adopted, and that the scientific organisation of the industry be developed as well as is humanly possible.—M. Barrowcliff in the *Agricultural Bulletin of the Federated Malay States*.

RUBBER ESTATES.

A correspondent of the "Financial Times" writing about the cost of rubber production calmly urges the necessity for revising the salaries of estate managers. This bold man would not, I presume, reduce the pay of really capable men. He says: 'All will admit that the European who accepts the risks and inconveniences of life in the tropics is deserving of adequate remuneration, but this does not justify the high salaries which are being paid on many estates. In the majority of these cases some justification could be found for these if really efficient and painstaking work were given in return. But what do we find? Many of the so-called managers and superintendents are callow civil servants and other officials, with but two or three years' experience of the tropics and none whatever of rubber cultivation. The inevitable result is that the most egregious blunders are constansly being made which will cost plantation companies thousands of pounds to rectify.'

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Coffea Robusta.

A correspondent writing to the *Revue Agricole*, the organ of the Chamber of Commerce of New Caledonia, recommends that, where the ravages of *Hemileia* and other diseases of coffee are severe, the plantations be replanted with *Coffea robusta*. Among the advantages claimed, according to an exhaustive study of it by M. Kramer, Director of Agriculture at Bintenzorg (Java), are: 1. The Robusta yields a first crop at two years of age; in the third year, the yield is $15\frac{3}{4}$ oz. per plant; and from the fifth year onwards, over $2\frac{4}{5}$ lbs. per tree. 2. The harvest continues in Java throughout the year, as the berries do not all ripen at the same time but during consecutive months and this is found to be a great advantage in the more economical utilisation of the labour force. 3. About 13 lbs. of cherry yield $2\frac{1}{5}$ lb. of beans. 4. More than all these, it is disease-resistant; although it cannot be said to be absolutely immune to diseases, it resists them successfully; the leaves do not fall off and the tree continues to flourish and fruit. 5. It is a good plan to treat the nursery plants with sulphate of copper or flower of sulphur.—*The South of India Observer*.

Indian Labour in Ceylon.

From the figures furnished in "The census of Ceylon, 1911, Estate statistics" by Mr. E. B. Denham, Superintendent of Census Operations, Ceylon, I note that among the total estate population in the island in 1911 of 278,558 males and 234,909 females, fully 234,594 males and 205,708 females are Indian Tamils, the greatest majority of whom are undoubtedly drawn from South India. Thanks to the comparative cheap and abundant labour still available to us in our province, our planters are not so hard put to in regard to the supply of coolie labour as are their compatriots in North India and especially Assam. But surely the whirligig of time must change the condition of things and then perhaps my friends will look aghast! At any rate, it is my firm conviction that their present rather lukewarm and half-undecided attitude will one day—not, I fancy, very far distant—land them in deep waters. Action is certainly imperative—something short, sharp and decisive, to check this huge annual exodus of our labouring population to Ceylon, Federated Malay States, and a host of other lands to which we are not related by birth of kin or any other mode of rhyme or reason. To sceptics, I would repeat Mr. Asquith's historic "Wait and see;"—*The South of India Observer*.

Scientific Officer's Papers.**CX.—ANTS AND THEIR RELATIONS TO SCALES AND APHIDS.**

Many insects which obtain their nutriment directly from plants by sucking up their juices excrete liquids which are eagerly sought after by Ants, and which constitute an important part of the food of some species. Among such insects the commonest are the plant lice, or Aphids, popularly known as 'Green-Fly,' the scale insects and mealy-bugs, and the tree hoppers.

In return for supplying them with food these insects receive certain services from the Ants and a definite relation exists between the two which in many respects resembles the relation between man and animals like cows.

A very large number of plants of widely different kinds are attacked by Aphids, and Ants often establish their nests near such infested plants and actually keep and tend droves of Aphids in their nests, or in specially constructed shelters built over them. The sedentary and gregarious habits of aphids expose them to a host of enemies such as predacious beetles and parasitic flies and from anthesis the Ants undoubtedly protect them.

Aphids and Scale Insects pierce the stems of plants on which they feed by means of a slender jointed mouth part and suck up the plant juice which consists of water in which is dissolved sugar and albumin. A large part of the sugar is voided by these insects in colourless drops. When this excrement drops on the leaves of plants it dries in the air and the sticky residue is known as 'honey-dew,' and it is this honey-dew upon which many species of Ants feed. Some kinds of ants obtain it by licking the surface of leaves and stems on which it has fallen, but many species have learned to stroke the Aphids more especially and thereby induce them to void the liquid gradually so that they can imbibe it directly. A drove of Aphids or Scales especially when it is stationed on young and succulent leaves and twigs may produce enough honey-dew to feed a whole colony of Ants for a considerable time.

Some Scale Insects attack the roots of plants. A familiar example in Southern India is *Dactilopius citri* which attacks the roots of coffee and is the 'Mealy-bug' which does so much damage to young clearings in Coorg. These Scales are harboured and protected by the Ants in their nests and in special shelters, constructed on the branches of the trees in the dry weather. Not only are these Scales kept in confinement by the Ants, but they are placed by them on the roots of the coffee. The Ants remove the earth from the surface of the roots and construct galleries and chambers around them so that the Scales may have easy access to their food and can move about at will. The Ants also take care of the eggs and young Scales storing them in their nests and later placing them on the roots to feed.

The construction by Ants of shelters over colonies of Scale Insects is a very interesting feature of their close relations. We may suppose that these shelters are constructed first for the purpose of preventing the escape of the Aphids and Scales to other plants, or to other parts of the same plant, and secondly for the purpose of protecting these insects and the Ants themselves from exposure to cold, air currents, moisture, and light, and thirdly for the purpose of protecting them from their natural enemies such as predaceous beetles and parasitic flies. For all these purposes the shelters are admirably adapted. From this it will be seen that in any methods adopted to control the attacks of Aphids and Scale Insects on cultivated crops the Ants are a factor which cannot be ignored.

RUDOLPH D. ANSTEAD,
Planting Expert.

VEGETABLE OIL FOR MOTIVE POWER IN THE TROPICS.

The question of Motive power on Tea and Rubber Estates is a most important one. Where fuel is used either direct or for making gas, the fuel reserve is becoming a pressing matter and constant enquiries are made about suitable fuel trees. Where oil is used, the cost and especially the transport difficulties come in. The article reproduced below suggests a remedy which is worth the attention of serious planters.

"Professor Sir William Ramsay has warned us, that if we do not take care and husband our supplies of coal we may, in the none-too-distant future, find ourselves far shorter of supplies for our factories, &c., than will be acceptable. Every authority of any experience has warned us, times without number, that if we go on in the future as we have persisted in doing up to now, and seem likely to persist in doing for some time yet *i. e.*, to cut down our forests anywhere and everywhere, anyhow and 'everyhow,' not only will our supplies of lumber cease, but far worse, our rainfall will be adversely affected, lands will be exposed and go out of cultivation, whilst cities and towns might, and probably will, be visited by floods on the one hand or draughts and short supplies on the other. The day of the shortage of coal has still to be experienced, though no one denies that Sir William Ramsay is correct in theory, but as to the evils of deforestation, of this we have proofs from all ages; from the clearances that caused the Gobi Forest in Asia, in China, the waste in the centre of Australia, or the Sahara in Africa, down to the floods of Paris of a little time back, and the present inundations throughout Norwich and East Anglia in England to-day. Absence of trees in all those cases has been the cause of the trouble.

"The Commission appointed by the Government to inquire into the possibility of oil-fuel for the Navy, as reported in another column, shows the attention being devoted by the highest authorities to the possibilities of mineral oil supplanting coal for fuel. The day such oil is officially recognised as *the* fuel for the Navy, it is certain to be utilized for the same purpose in the merchant marine as well; if, that is to say, it has not already been adopted by their steamers. In that case coaling stations will follow hansom cabs, and become a curiosity instead of a common sight, and Sir William Ramsay will see, if he is still among us, that one of the largest consumers of coal will have turned its attention to other supplies.

"For land motive power, and especially for motive power up country in the tropics, however, neither coal, gas, nor mineral oil is suitable, simply because it is seldom if ever available. On this account gas or oil engines, which are met with everywhere in the temperate zones, and at large centres of trade in the tropics disappear altogether just where they are most needed, that is in the tropical hinterland, and on this account simply because the fuel is missing or too costly. Articles which have appeared in the Press lately foreshadow as great a revolution in the fuel supply for land motive power, as the utilization of oil on steamers will cause on the sea.

"The huge possibilities of the internal combustion engines constructed on the lines invented by Dr. Rudolph Diesel, being able to use vegetable oils as fuel, "points out a writer in *Chamber's Journal* may quite possibly

in time after the entire geographical distribution of the industrial centres of the world; for in that case the nut plantation of the future will bear the same relation to the factory that the coal-mine does now." We have always maintained that the twentieth century will be the century for the tropics. This being so we may see the tropics during the next hundred years producing and utilizing its own supplies of fuel in the shape of ground-nuts, or other vegetable oil, according to which works out cheapest in the various localities.

"In France engines of the Diesel type have, we are told, been worked with pea-nut oil from the north of Africa. In Russia castor oil is used. Russia as a producer of mineral oil is particularly worthy of note, for castor oil does not appeal to us as being in any way as advantageous as pea-nut oil, being somewhat sticky if nothing else, and yet if Russia uses castor oil, we can reasonably take it that the owners of the engines find that the value of the unit of heat in this vegetable oil can be produced at a lower price than it can with mineral oil. If this is so in Russia, which has the mineral oil, but not the castor-oil plant on the spot, how much cheaper and better should it be with the tropics where they can get ground-nuts and a host of other oil-yielding nuts on the spot, but where mineral oil as a rule has to be brought from America or Russia. "As the underground resources of mineral oil and coal," points out the Journal of the Jamaica Agricultural Society, "become more and more depleted, the conditions in favour of vegetable fuel become more and more favourable."

"This is very true, but may be the tropics, if no other centres, will not wait until the coal and mineral oil supplies are depleted, and why should they? If they, up in the backwoods, or away from the seaports, can use engines of the Diesel type with nut-oil for fuel, the unit of heat value of which is sufficiently cheap to enable them to turn out produce on the spot, whether raw material or manufactured goods, there is no need to wait; the forests can be cleared and transport provided, factories erected, and local industries started, as the Brazilian Government, among others, are trying to start, because there, right in the heart of the tropics, they can raise their fuel supplies, viz., acres and acres of nuts planted to supply the oil, augmented possibly by other vegetable oils from indigenous trees whose nuts can be collected in the virgin forests around. What this would mean to Brazil and South America generally is inconceivable to-day.

"America, like ourselves, is also alive to the possibilities of engines able to utilise nut-oil as fuel. "Coal then in its crude shape is doomed," said Stead (of the *Review of Reviews*) just before his death, and our contemporary, *Current Literature*, of New York agrees. "Nut-oil to replace coal," they say, "this means no wagons, no stokers, no smoke." The Diesel oil engine, we are told, is an engine which is driven by oil. Not oil fed into a furnace to generate steam, "but oil used direct—and in the earth-nut (*i.e.*, ground-nut) *Arachis hypogaea*, you have an inexhaustible supply of force drawn year by year from the soil which will never fail you."

"Those therefore who are running estates, tea, coffee, sugar, Cacao, cocoanut, or what not, must keep their eye on what is being said and printed concerning these internal combustion engines, and the possibility of using vegetable-oil for their fuel."—*Tropical Life*.

THE CEYLON ADMINISTRATION REPORTS.

The Ceylon Administration Reports for 1910-11 have just been received and constitute a bulky volume full of interesting information. An endeavour will be made in these articles to extract some of the items of more special interest to planters in Southern India.

The Vital Statistics are dealt with by the Registrar-General. The population of Ceylon as enumerated at the Census of 10th March 1911 was 4,105,535 which is an increase of 15·1 per cent. since the last Census in 1901. The following table of Indian Immigrants is given, showing the arrivals and departures of Indian Coolies over a series of years. This is most interesting just now as bearing on the labour question :—

Year.	Arrivals.	Departures.	Excess or Deficit.
1900	207,994	112,936	95,058
1901	129,603	118,343	2,260
1902	87,763	63,917	23,846
1903	77,966	47,715	30,251
1904	77,302	56,246	21,056
1905	160,080	65,513	94,567
1906	88,945	59,659	29,286
1907	55,724	63,671	7,947
1908	86,401	78,740	7,661
1909	79,845	61,287	18,558
1910	118,613	64,660	53,953
Yearly-Average—			
1871-1880	102,511	82,471	20,040
1881-1890	57,856	52,752	5,105
1891-1900	121,484	85,057	36,427
1901-1910	95,324	67,975	27,349

The Author points out that after 1907 the experience necessitated the appointment of a Labour Commission on whose recommendation the Ordinance No. 9 of 1909 was passed. Simultaneously there occurred an improvement in the labour conditions till, in 1910, the arrivals rose to 118,613 and the excess of arrivals over departures was 53,953.

At the Census of 1911 there were 7,625 Europeans in Ceylon, and 1,059,354 Tamils out of the total population. The birth-rate in 1910 was at a rate of 39 per thousand, and the death rate 27·3 per thousand as against 31 per thousand in 1909 showing that the public health was better. The number of deaths due to all causes on estates, (by which is meant more than ten acres of cultivation) was 15,642, of which nearly half were due to specific, febrile and the zymotic diseases.

The Director of the Royal Botanic Gardens says in his report, "the number of complaints and inquiries regarding the fungus diseases of tea, rubber, and cacao has probably been below the average, partly owing to the exceptionally dry weather which marked the first five months of 1911. Most of the diseases sent in have been readily recognizable with the help of the excellent series of Circulars published by Mr. Petch, and no new disease of a serious nature has been reported." Attention has frequently been called to the nodules on rubber trees during the dry weather, and the view is expressed by the Mycologist that these nodules are not associated with any particular fungus, and their occurrence is ascribed in a large number of cases to the use of pricking tools of the rotating or spur pattern. The Director adds, "in my own experience the appearance of these nodules is

certainly most frequent on pricked trees, but I am informed that they are not in-frequent on trees which have never been pricked. In the latter case, over tapping, a high elevation, and dry weather seem to be definite factors in their production; anything in fact which tends to reduce the vitality of the tree."

Dealing with the discolouration of biscuits, the author says, "It is perhaps only a coincidence that an increased number of complaints regarding the appearance of different kinds of spots during the preparation of rubber have synchronised with a period of exceptional drought." The majority of cases are undoubtedly to be attributed to the action of bacteria, and in these cases the remedy is to be sought in the disinfection of the curing house of the utensils used in the preparation of the rubber. The simplest and most effective disinfecting agents are sunshine and boiling water. Care must also be taken that the water supply is not contaminated. It appears, however, that other kinds of spotting appear which cannot be accounted for by the action of bacteria. Some of these require further investigation."

Ceylon like most agricultural countries has an Ordinance in operation for the prevention of importation of pests and diseases from outside sources, and also one for the compulsory treatment of local pests. In November last a new rule came into force by which Tea Seed was added to the list of guaranteed articles, and all Tea Seed imported is now treated at the Government fumigatorium.

In the Report of the Inspector of Factories it is stated that there are 863 Tea factories and 11 Rubber factories in Ceylon, and the annual output of tea is from 100,000 to 150,000 lbs., the number of persons employed daily in the Tea factories being 15 to 25.

R. D. A.

"Rex" writes from London on 27th September, 1912:—

"Mr. M. de P. Webb's article on India Office finance in your issue of 5th September, serves a useful purpose in questioning the necessity of upholding such large cash balances by the India Office, and why such balances should go on increasing every year. Some reason should certainly be given by the Secretary of State to explain this apparently wasteful item of finance, and the Indian Chambers of Commerce would be justified in asking for an explanation from the Government of India. These balances are probably at their largest about 31st March, when the statement of accounts is issued. The average balance of the year is probably much below the balance then shown. But allowing for that, the annual increase in these accumulations, of what must be termed idle money, and seems to me to justify Mr. Webb's reference to them as the proceeds of unduly heavy taxation. Also it must be admitted that these balances are extremely useful to London Banks and financiers. It is a perfectly right and fair question to ask if, in the first place, these balances are the result of over-taxation, and secondly, if the taxation being necessary the money is being used to the best advantage of India.'—*Capital*.

Since the beginning of July a constable of the Indian police has been placed on duty in Colombo harbour. I am told that he has been put there to detect absconders from India arriving at this port. Whether he will really be able to detect them is, of course, another matter.—*Commerce*.

RUBBER.

The German Press and Synthetic Rubber.

The Synthetic rubber discoveries have provoked a lively and acrimonious discussion in the German Press. The "Deutsches Kolonialblatt," commencing on the artificial fish rubber states that the process is neither of value nor is it new, having been tested some years ago by the "Centrale für Kantschuk" and found quite devoid of industrial interest. In the process the albumen is separated from the fish bodies. The product is afterwards fermented with formaldehyde. The resultant substance therefore represents nothing more than a kind of gelatine composed of fish manure and formalin afterwards treated with sulphur. Extensive tests have proved the inability of this material to resist the action of water. Hence the substance is valueless even as a substitute.—*Greniers Rubber News*.

Use of Atmospheric Nitrogen.

DR. EYDE SHOWS EFFECT ON EXPLOSIVES INDUSTRY.

Dr. Samuel Eyde, of Christiania, Norway, delivered a lecture on Saturday before the International Chemical Congress at the Museum of Natural History on the "Utilization of Atmospheric Nitrogen for the Manufacture of Fertilizers and Products in the Explosive Trade." The lecture was illustrated with photographs and charts showing the wonderful development of this industry in Norway during the past eight years, having now reached a utilization of 200,000 horse power, with a total production of 120,000 tons per annum. The products of the company have already been introduced into the United States, and considerable success has been attained in nitrate of ammonia and nitrate of soda, and a great market is expected here in nitrate of lime and concentrated nitric acid. The methods of manufacture are constantly being improved upon and new products will be manufactured from time to time. The purity of the products manufactured, especially nitrate of ammonia, will, according to the experience of the British navy, have a vast bearing upon the life of the heavy guns, as this purity reduces the heat of the discharge. The factories employ comparatively few workmen. Hence the materials can be most economically manufactured.—*New York Journal of Commerce*.

Potash Deposits in Nevada.

BEDS FOUND NEAR GOLDFIELD WILL BE THOROUGHLY MINED.

Goldfield, Nov., Sept. 24th.—Potash deposits recently found near Goldfield are believed to be of enormous value. There are substantial indications of the presence of commercial potash at a number of points in Southern Nevada, and recent tests of material taken from the eastern border of the Silver Peak salt marsh or dry lake, less than 20 miles west of Goldfield, have yielded results that point to this as the most important discovery yet made in the State and the one most likely to produce potash of a high degree of purity. A number of Goldfield people have filed on placer locations in the district and the ground is to be prospected and tested in a thorough and exhaustive manner.

For more than a year past the Soils Bureau of the United States Geological Survey has been conducting a systematic search for commercial potash and a similar quest has enlisted the efforts of many individuals and corporations, including the Standard Oil Company and the "Borax" Smith interests. The discovery of potash in quantity would tend to break the world monopoly of this product now held by Germany and put an end to the payment by the United States to Germany of many millions of dollars.—*New York Journal of Commerce*.

The Direct and Indirect values of Scientific work.

The great improvement which has taken place in recent years in the application of scientific knowledge to the practical affairs of agriculture has exercised a most beneficial influence over the results obtained from the cultivation of crops and the rearing of stock. If the agricultural progress of the world during the past twenty-five years were to be carefully scanned, many instances would be found illustrating the value of the work of scientists when the results of such work were properly applied to the solution of existing problems. All branches of science would yield instances illustrating this point; but for the present purpose, a brief consideration of a few entomological problems will suffice.

From the instances given below it will be seen that the study of such problems often leads to the discovery of facts which have an importance greater than that of the original investigation, and extend much beyond the limits suggested by the problem under consideration.

The study of cattle ticks and Texas fever resulted in a knowledge of the dissemination of several diseases by insects and ticks; the attempts to control the San Jose scale brought about the production of a number of contact insecticides of greater efficiency than those previously known; the struggle against the gypsy moth caused the commercial production of arsenate of lead, and gave a stimulus formerly unknown to the attempts to import and establish natural enemies for the control of an introduced pest; while the steady warfare waged against the cotton boll weevil has produced favourable changes in agricultural practice, in the infested districts, in the matter of cultural methods, rotation and diversification of crops.

The study of ticks in relation to fever in cattle has brought about an accumulation of knowledge of the most useful and varied kinds. In the first place, a study of the life-history of ticks, and of the disease known as Texas fever or tick fever, demonstrated the fact that the micro-organism causing the disease is transmitted to healthy animals by the bite of the tick, and it was further found that no other means of infection could be proved than the bite of ticks which had previously fed upon infested animals. This led to studies of ticks and biting insects which resulted in giving a knowledge of the manner of transmission of malaria, yellow fever, sleeping sickness and filaria—among the diseases of the human subject—and of the several tick—and insect—borne diseases of domestic animals. This knowledge has had the effect of causing all biting and blood-sucking arthropods to be regarded with grave suspicion as to the part that they may play in the dissemination of disease.

Further study of the tick led to a knowledge of its life-history and habits, from which it appeared that the fully-gorged female ticks drop from the cattle in order to deposit their eggs on the ground, and that the young hatching from the eggs can live for only a certain time without food. This led to the adoption of a pasture rotation system, which consists of the practice of enclosing cattle on a certain area during the time when the adult ticks are dropping, and removing them to another, tick-free area before the young are hatched; cattle are prevented from entering the pasture where the eggs are deposited, until the young should all have died for want of food. This, in general, is the practice by means of which large grazing areas have been rendered tick-free in certain of the Southern States, and in consequence fever-free. In this manner more than 100,000 square miles of territory formerly included in the tick-infested area is now declared tick-free, and the

cattle industry of that region is thus relieved from a tax, imposed by parasites and disease, which was formerly very severe.

The benefit derived from the employment of insecticides in combating insect pests is incalculable. In many parts of the world certain crops are subject to attack by insects of different sorts, and in order that profitable returns may be obtained, it is necessary that the effects of insecticides of various kinds should be understood and the life-history of the insects known. The proper insecticide can be used so as to produce the greatest killing effect on the insect and the least injurious effect on the crop plant.

Not many years have elapsed since the use of insecticides was but little understood, and when there were but few well-known substances available for the purpose. At the present time there are several arsenical and other stomach poisons, prussic acid from potassium and sodium cyanides as a fumigant, and a great variety of contact spray materials including such substances as kerosine and other oils, soap, rosin, salt, sulphur and lime, the use of which is understood by planters and farmers in those localities where it is necessary.

The San Jose scale has been a serious pest on apple and other orchard crops in nearly all parts of the Temperate Zone, and it is due largely to the resistance of this insect to the ordinary spray washes that so much improvement in contact insecticides has been made in the past few years.

The gypsy moth is a European insect which during the past twenty-five years has been a most serious pest to orchards and woodland in the Eastern United States. When the attempt was made to control this pest by means of Paris green and London purple it was found that these insecticides were not efficient, for the foliage of the trees was injured by the poison even when used at strengths which were insufficient to kill the caterpillars of the moth. To meet the need for a more satisfactory poison, lead arsenate was prepared. This compound can be used in mixtures with water at strengths sufficient to kill any leaf-eating insect without injury to the foliage, and is thus one of the most useful arsenical insecticides for spraying plants, if not the most useful insecticide among these.

Another result of great value that has come about from the study of the gypsy moth problem is the stimulus that has been given to the interest in control by natural enemies; this method of control had been used previously, notably in Hawaii, California, and Australia but probably nowhere on the same large scale. Parasitic and predatory insects from Europe and Asia, where the gypsy moth occurs, are transported in enormous quantities to Eastern Massachusetts, where they are carefully reared in the insectary, and colonized in the open. This work is still in an experimental stage, although it is being carried out on a large scale involving the expenditure of enormous sums of money.

The Mexican cotton boll weevil is one of the most serious pests of an agricultural crop known. Less than twenty years have elapsed since this insect spread from Mexico into the cotton fields of Southern Texas. During this period it has progressed steadily north and eastward, until it now occupies a large part of the cotton belt. No insecticides or remedial measures have sufficed to stop its progress; native parasites do not seriously reduce its numbers, and wherever it becomes established it greatly reduces the yield of cotton. As a result of careful study and investigation over a long series of years, it has been found that early planting of early maturing varieties greatly reduces the liability of serious attack; while cultural methods such as wide planting, which allows the sun to penetrate to the

ground between and under the plants, the early destruction of all cotton plants as soon as the crop is harvested, and also the complete removal and destruction by burning of all weeds, rubbish and cornstalks which would furnish hiding places in which the boll weevils might hibernate, still further reduce the severity of the attacks. In addition, a system of rotation has been devised which is in use in many places, and this often results in a diversification of crops which is most beneficial. By these means the Southern farmers are able to grow profitable crops of cotton in spite of a most serious pest, and they will ultimately gain an advantage as a result of the changes in method, that they are being forced to adopt, which will probably be greater than the losses which they at first experienced.

All these examples are of the greatest interest on account of their direct value. Some of them are useful, further, in that they serve to afford instances where, although the degree of success first anticipated has not been attained, the bold continuation of the work has proved to be of incomparable benefit and has often brought about salutary changes in methods which, probably, could not have been caused to accrue in any other way.—*Agricultural News*.

Useful Information Concerning Camphor.

The Department of Agriculture of the Federated Malay States has issued recently Bulletin No. 15, which deals with the cultivation and preparation of camphor in the Federated Malay States. The following information, or more immediate interest in the West Indies, is abstracted from parts of this bulletin.

Varieties of Camphor.—In the East, two distinct kinds of camphor are known, that from the tree called *Cinnanomum Camphora* known as Chinese, Japanese, or Formosan camphor, and the product known as Borneo camphor, that is obtained from the plant *Dryobalanops aromatica*, which grows in Borneo, Sumatra and Malaya. The two products are distinct chemical compounds, but it is possible to prepare ordinary camphor from Borneo camphor. A third camphor is known, called Nagai camphor, which is yielded by *Blumea Balsamifera*, a plant growing in Burma.

Supply and uses of Camphor.—The exports of camphor from Japan in 1905, 1906 and 1907 were 1,350 tons value £261,756; 1,570 tons value £370,545; and 1,805 tons value £512,730; from China in 1905 and 1906, they were 320 tons value £59,840 and 882 tons value £222,264. Most of the Japanese camphor comes from Formosa: information concerning the production in this island was given on page 9 of the present volume of the *Agricultural News*.

About 70 per cent. of all the camphor obtained is used in the manufacture of celluloid, or xylonite: most of these remained is employed for medicinal, pharmaceutical and sanitary purposes. An idea is prevalent that camphor is used largely in the manufacture of smokeless powders and explosives; only a small amount is at present actually employed in this way.

Synthesis of Camphor.—As is well known, synthetic camphor has been produced on a commercial scale, but it cannot compete successfully with natural camphor for any length of time. It is made from oil of turpentine, and its preparation in the countries where it used to be made—England and Germany—has probably ceased because of the fall in price of natural camphor since 1907. Its existence is useful, however, because it prevents any extensive inflation of the prices of the natural product.

Distillation of Camphor in Japan.—The camphor is steam-distilled and the vapour condensed in a box, divided into compartments and placed upside down, in water, in a larger, shallower box. The sides of the inverted box extend above the bottom, and water is constantly allowed to run on to this box, keeping it cool and renewing the layer of water in the larger, shallower box which acts as a seal. A third box is inverted over the first, and is made in a similar way to condense any vapour that may escape; in both cases holes are made in opposite corners of the partitions in the boxes in order to cause the vapours to travel by a circuitous route. The crude camphor and oil are skimmed from the surface of the water or scraped from the sides of the condenser; separation of the two products is effected as far as possible by pressure.

Cultivation of Camphor.—A method of cultivation recommended by the United States Agricultural Department was described on page 5 of this volume of the *Agricultural News*. In Malaya, before planting takes place, the seeds are soaked in lukewarm water for twenty-four hours, and the resulting seedlings transplanted when about a foot high, the tops being first cut off and the roots pruned. The transplanting is done during the wet season, and careful weeding is necessary. Well-prepared nursery beds are employed, and sand is added to the soil so that it may be sufficiently porous not to allow the seeds to rot during their long period of germination. So far, this method of propagation, as well as that from root cuttings, has not proved successful in Malaya, and it is considered at present that the best way to obtain a stock of plants is to import two-year-old seedlings from Japan, provided that the price of these is reasonable. Success has been obtained by using this method.

Experiments in Distilling Camphor.—In initial experiments in Malaya, with material from Batu Tiga, Selangor, 26 lbs. of prunings, consisting of leaves 64·9 per cent. and small stems 35·1 per cent. was used. This gave, as the result of different distillations, 0·19 lb. of distillate, the yield on the original material being 1·06 per cent.; the proportion of oil in the distillate was very small.

Subsequently, experiments were carried out on a commercial scale; a useful, detailed description of the apparatus employed is given in the bulletin. Separate distillations gave the following results:—

Weight of material.	Percentage of whole plant.	Yield of camphor and oil in oz.	Yield per cent.
12·5 lb.	...Leaves 7·5	... 2·00	... 1·00
30·0 „	...Stems (under $\frac{1}{2}$ inch diameter) 18·2.	... 1·07	... 0·22
93·0 „	...Woody stems (over $\frac{1}{2}$ inch diameter) 56·3...	9·08	... 0·61
29·5 „	...Roots 18·0	... 5·07	... 1·10

The distillate from all parts except the roots consisted chiefly of solid camphor with very little oil. That from the roots was comprised entirely of an oil apparently quite distinct from that given by the other portion, and possessing what is described as a lemon-camphor odour. The results of the experiments are thus summarized in the bulletin:—

(1.) A yield of about 1 per cent. of camphor and oil (consisting chiefly to camphor) may be obtained from prunings from five-years-old plants and probably from younger plants.

(2.) The distillation period should not exceed three hours in the case of prunings, that is leaves and young branches.

(3.) A much larger proportion of camphor is obtained from the leaves than from the branches, and the yield from small twigs is greater than that from older branches in trees of this age.

(4.) Air-drying of the leaves has not detrimental effect on the yield, but loss would probably result if the leaves were exposed to direct tropical sunlight.

Further experiments were conducted during 1911-12, using a new condenser, the old one, which was Liebig condenser with four tubes round which cold water circulated, having proved unsatisfactory, for reasons that are given. The new condenser was made of teak; it was replaced later by a metal condenser constructed of galvanized iron having the following dimensions: length 3 ft. 10 ins., breadth 2 ft. 4 ins., depth 1 foot 7 ins., extension of sides over bottom 4 ins., length of exit pipe $6\frac{1}{2}$ ins., diameter of exit pipe 2 inches. This was placed in the shallow box used for the teak condenser, which was 4 feet long, 2 feet 6 inches broad and 1 foot 1 inch deep the depth of water in it being 6 inches. This condenser was found to give excellent and constant results, the yields being considerably increased. Further, the camphor was 'of a beautiful white colour' and the camphor oil was pale yellow. No corrosion took place during three months' use, and the joints, which were soldered, showed no signs of leakage. The matters thus described are of importance, as they show the way in which one of the chief difficulties connected with the distillation process, namely that of condensation, was solved.

In the trials with the metal condenser, 5,338 lb. of prunings were used; these gave, as a result of several distillations, a total yield of camphor and oils weighing 34'96 lb., or 0'66 per cent. on the weight of the original material.

Several other matters of importance are included in the Bulletin, which is usefully illustrated to show the construction of the apparatus employed for distillation on a commercial scale.—*Agricultural News*.

The Raw Material Position of Rubber.

The rubber statistics published by Messrs. S. Figgis and Co., on the 1st of September support the bullish views as to the future of the raw material. The visible supplies, and the price of Hard Para on the same date for the last four years are given as follows:

	1909.	1910.	1911	1912.
Visible supply	3,063	4,248	7,265	4,135
Price of Hard Para	7s. 11d.	8s.	4s. 8d.	5s. 1d.

The receipts at Para including Caucho show an increase of 310 tons over 1911. The landings and deliveries in England and America from the 30th June to the 31st August are highly satisfactory as showing that the demand keeps well up with the supply. The figures are—

	England.	America.
	Tons.	Tons.
Landing	2,176	2,480
Deliveries	2,219	2,470

Continental stocks show a decrease, the imports being 765 tons against deliveries 800 tons. The interests of the consumers and producers are of

course to a certain extent antagonistic. Those desiring cheaper supplies of the commodity naturally affect to believe that the increasing outputs must be largely in excess of the demand. When confronted with the great increase in the motor traffic the constant accession of motor buses in the streets, of motor cars all over the country for excursion and coaching purposes, and the rapidly expanding demand for motor lorries, it is pointed out that economising influences are at work, that less material is being used, and the wear and tear considerably reduced. Nearly all Mincing Lane men are agreed that a shortage of rubber is again in sight. The Mincing Lane view is of course derived from a broader outlook than that of the manufacturer who simply speaks from the point of view of his limited personal experience. The action of the United States Rubber Trust in planting up as quickly as possible large areas with rubber quite regardless of cost is strong presumptive evidence that the world's biggest rubber consumer looks upon rubber as likely to prove highly remunerative. At the General Meeting of another large consumer of rubber, the Dunlop Company, the Chairman Mr. Arthur du Cros, made some interesting remarks, which we reproduce below :—

I will deal with the question of the rubber estates now. The idea of investing in rubber estates, and becoming our own growers of rubber, is not a new one. We always believed in that necessity. It was of vital importance to a company buying so largely of this produce in the open market, in these days to obtain it on better terms than the terms offered in the market, and for the last ten years we have been endeavouring to get into that position, apart, of course, from the other considerations that the business is a profitable one entirely on its own merits, and that it secures to us a certain amount of independence in regard to the market fluctuations of rubber. In 1900 we began by sending expeditions to the Amazon Valley, Central America, Mexico, and the West Coast of Africa, and we investigated the conditions of rubber producing at that time very closely indeed; but we found that they were too speculative and too uncertain for us to advise our shareholders to invest their money in. At a later stage we examined the possibilities of cultivating rubber in the Middle East—in Ceylon and the Federated Malay States, and generally in the Middle East. We found that to be a perfectly practicable proposition. It was not complicated by the operations of any "ring;" it was a clean business, and easily understood. Then, gentlemen, as the result of our investigations, we acquired the first of rubber estates in 1909. I do not say that we commenced to plant in 1909; we purchased estates which were to some extent matured, and, as a matter of fact, some of the rubber owned by the company is to-day between six and seven years old.

We have continued these operations until to-day we are in a position to state that there are hardly half a dozen larger planting companies in this country than ourselves. We own nine different estates comprising over 17,000 acres. Of that area over 6,660 acres are now planted, and at the end of this year we shall probably have nearly 7,500 acres planted. We do not propose to rest there. Our programme next year will probably be a very extensive one, and we shall bring up that acreage to nearly 9,500 acres, still leaving over 8,000 acres of undeveloped rubber land the property of this company. All our estates are situated in the Middle East, which is the most favourable part of the world for growing rubber. We are obtaining rubber to-day from seven of those nine estates, and as those of you who are acquainted with rubber planting properties know, as time goes on rubber matures speedily, and in our case large blocks of rubber are now rapidly approaching the bearing stage. We have been obtaining rub-

ber from, I think, seven of our estates during the whole of this year. We are erecting four factories upon these four groups of estate for the purpose of dealing with their rubber and we find that we can improve upon the method of manufacture of the raw material which we find in vogue in the Middle East, because our experience as rubber manufacturers shows us what is necessary, and we think that the quality of the rubber produced can be improved. Now, generally, I want to say that we consider, having given this matter the most exhaustive attention, and having considered it most carefully and at great length, that our estates are well situated.

The future prospects of rubber planting I consider are very good, but at the same time they are more problematical in the case of planters, and those who only deal with planting, than they are in the case of manufacturers who both grow and manufacture. I have told you that the Dunlop Rubber Company at the end of this year will have 7,500 acres of rubber, and those estates are taken at cost in our balance-sheet, and in the figures of our estates to-day I have taken them at cost, and have made no appreciation, although some of them have been in our possession since 1909. The Dunlop shareholders so far have not had an opportunity of putting a value upon this development of our business, because it has not been possible for us before now to tell them exactly what we have done. I think that a company like ours, engaged in the complete industry, if I may put it that way both the beginning and the end of it, the production of the raw material and then the treatment of that raw material—is in a very strong position, and I think, that any company in that state has a very assured position.

These opinions are worth noting as showing that the leading manufacturers in England and the United States are convinced that the rubber industry has come to stay and is likely to prove highly profitable for many years to come. Faith in the rubber industry is gradually spreading among big interests, and when the feeling broadens out among the whole of the mercantile community we shall see rubber shares stand on very different investment level from that ruling to-day.—*Greniers Rubber News*.

DISEASES OF RUBBER.

Mr. T. Petch, the Government Mycologist, spent a useful day in Kalutara yesterday, and what the planter of that district does not know about canker now is not worth knowing, or at least is not known by anybody else. Canker in Ceylon has proved less serious than was at first anticipated, but it is still a disease that requires to be treated with a great amount of respect, and the remarks of Mr. Petch, which we give in full elsewhere, will repay study by every rubber planter in the Island. It will be noticed that Mr. Petch gives the tried methods of treatment of the diseases and only recommends spraying, as a means of prevention, tentatively until it is found out whether it prejudicially affects the quality of the rubber. Ceylon has in its comparative freedom of disease a great advantage over Malaya, where the white ant is so troublesome, and it is to be hoped that this advantage will not be lost, or at least not by a deterioration on the part of this country.—*The Weekly Times of Ceylon*.

The Planters' Chronicle.

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Scientific Officer's Papers.

CXI.—STUDIES OF LEGUMINOUS GREEN DRESSING PLANTS.

I. . SESBANIAS.—(Continued.)

In Scientific Officer's Paper, No. 107, (P. C., Vol. VI, p. 484) the *Sesbanias* as green dressings were dealt with to some extent. Since that paper was written a sample of *Sesbania aculeata* has been forwarded to me for analysis by the Scientific Assistant for Mysore. This came from a plot of this plant which is being grown as a green dressing on Baithney Estate near Saklaspur in South Mysore. It is a shallow rooting plant in this situation forming dense masses of spreading roots covered with nodules.

The following analysis was made of the whole plant, including roots, stems, and leaves. The leaves themselves contain 3.74% of Nitrogen in the dry matter:—

				Whole Plant ; Roots, Stems and Leaves.	
				As received.	Calculated to dry matter.
Moisture ...	...	...	...	27.34	—
*Organic Matter	...	...	...	60.38	83.11
Ash {	Silica	...	...	—	0.59
	Phosphoric Acid	...	...	—	1.13
	Potash	...	...	12.28	4.15
	Lime	...	...	—	1.61
	Other Mineral Matter (by difference)	...	...	—	9.41
				100.00	100.00
*Containing Nitrogen ...	...	...	...	—	2.65

					Ash Analysis.	
Silica	...	...	...	...	3'51	
Phosphoric Acid	...	...	...	...	6'66	
Potash	...	...	...	...	24'59	
Lime	...	...	...	...	9'54	
Other Mineral Matter (by difference)	...			...	55'70	
					100'00	

It will be seen that this analysis differs considerably from the one quoted from Ceylon in Sc. O. Paper No. 107. This is probably due to the fact that the Ceylon analysis was made on stems and leaves only, though there is nothing in the original to show exactly what the material analysed was. The leaves of the Ceylon grown plant contained 3'33% of Nitrogen, which is in close agreement with the Indian sample.

In a 'Note on Manures' published as Bulletin No. 23 of the Assam Department of Agriculture, the following account of *Sesbania aculeata* as a green dressing is given:—

Dhaincha. (*Sesbania aculeata*).—Is particularly useful as green manure in this Province, as it grows well on almost every kind of land. It makes good growth even if the lower parts of the plants are submerged in water, though it cannot stand too much water in a very young stage. It produces a large amount of leaves and will grow up to 10 or 12 feet high. The stems, however, become very woody if left too long, and are not easy to incorporate with the soil afterwards. If allowed to stand too long and become woody, the stems do not easily decompose in the soil; in fact they more often persist throughout the ensuing season, opening up the soil to such an extent as to diminish the water content of the surface soil at a time when moisture is extremely valuable. Perhaps the most suitable stage to plough it into the soil is when it is 5 or 6 feet high, but no rule can be laid down as other considerations such as the crop which is to follow, and the character of the season largely determine when ploughing in shall be done. *Dhaincha* should be sown as early as possible after the first seasonable rains fall, and should be ploughed in by about the middle of July. On the Dacca Farm, *dhaincha* sown early in May grew luxuriantly, producing a 5 to 6 feet crop which was ploughed in early in July with excellent results, decomposing entirely in a short time.

"On the old alluvial soils of the Dacca District (and the same would no doubt apply to similar soil formations in other parts of the Province, some preliminary work done by me last year shows that a good crop of *dhaincha* adds much more organic matter and nitrogen to the soil than we can get from *sunh-hemp*."

RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**Anamalai Planters' Association.**

Proceedings of a General Meeting of the Anamalai Planters' Association held at the Paralai Bungalow, on Monday, the 14th October, 1912.

PRESENT.—Messrs. G. A. Marsh (Chairman), G. L. Duncan, J. Harding Pascoe, E. W. Simcock, B. A. Marden, E. Fowke, G. Hayne, J. H. Ireland Jones, A. C. Cotton, H. N. D. Walsh, J. O. K. Walsh, H. W. deSalis, M. B. Pollard Urquhart, J. Hatton Robinson (Honorary Secretary).

1. The previous meeting's proceedings were confirmed.

2. *Report of Delegates to the U. P. A. S. I. Meeting.*—The following Report was read to the Meeting :—

Gentlemen,—As directed by you we attended the Nineteenth Annual General Meeting of the U. P. A. S. I. held at Bangalore as your representatives.

The Meeting was well attended, twelve District Associations being represented by 20 delegates.

You will have read both the Chairman's Address and the Secretary's Report in the press—the latter being a very brief summary of the year's work—as could only be expected, seeing that Mr. Norton took over the office from the late Secretary a few days previous to the Meeting and evidently experienced much trouble in getting hold of the necessary information to work out his report on.

The Chairman's Address as you will doubtless agree was very tactful. Mr. Abbott had had a year of great difficulty in getting the work of the Central Association carried out, and during that time he upheld the dignity of the Planters under often very trying circumstances.

The Proceedings have appeared in the *Daily Press*, so that you will have already read as much about the Meeting as we can tell you. Much important matter, however, was discussed in Committee, and this you will get when you receive the Book of Proceedings.

The chief items which are of interest are the following :—

Roads and Communications.—We supported the Coorg men in their resolution to again approach the Government towards opening up the Province of Coorg by means of Railway connection.

Mr. Hughes brought forward a very strong argument in supporting the Karachi Chamber of Commerce in their contention that the Cash Balances held in London on behalf of the Government of India, some £18,000,000, could be very much better employed in this country in building Railways and Communications, than being lent out at home at a very small interest, in fact, in certain cases, at no interest at all.

We seconded Mr. Hughes' resolution which was carried.

Weights and Measures.—All of us know how coolies coming from different districts grumble at the measure used in this district; we were, consequently, only too glad to support the resolution brought forward "that the Central Association approaches the Governments of India (through

the Government of Madras), Mysore, Travancore, and Cochin, that further steps be taken towards the general standardization of all weights and measures in India."

Finance.—Here we had a difficult problem to face. We had your instructions that we were loyally to support our still belonging to the parent Association—that your Association was not in agreement to pay a higher subscription—that if a higher subscription was necessary, it must be due to obligations due to the Scientific Department. On the other hand we had your instructions regarding labour matters to support any workable scheme leading towards the combination of the various districts.

As the Finance question had first to be settled we could not see how we were to promote your interests when the labour question came up—unless we joined in with the majority and paid more so as to swell the Association's funds. From the Finance Committee we learned that the Scientific Department had not increased in expenditure. Those Associations who could afford the luxury of Scientific Assistants were paying extra for them—the payments these Associations made merely went through the parent Association's books, but had nothing to do with the old Scientific Department which we have always supported.

We were informed that the parent Association, on the 2 anna basis, was collecting a larger income than ever before.

Subscribing as we did only Rs.310-12-8 for 7,459 acres, we could not feel ourselves in a position to demand labour reforms—unless we also fell in with the other Associations and paid what they did. We therefore agreed to come in on the 2 anna basis, which covers our subscription to the Scientific Department as well, on the understanding that the U. P. A. S. I. funds were put on a sound basis, and that some workable scheme for improving labour matters shall be brought forward in the near future.

Planters' Benevolent Fund.—It was resolved to ask the Mercantile Bank of India to take charge of the investments and funds, and that cheques drawn upon the fund require the signature of the Chairman for the year as well as the Secretary of the U. P. A. S. I.

Agricultural Matters. Fertilisers.—The Scientific Department were asked to try and see their way to periodically verify the guaranteed analyses of manures sold by different manure Firms. The Scientific Department in this matter alone will be of considerable help to us—and Mr. Anstead is to be heartily thanked for so promptly letting us know the results of some manures recently sent to him for analyses. These results will be made known to the members of the Association.

Labour.—This is a matter with us which puts in the shade all other problems connected with our planting. We have been agitating for years for labour reform, and in 1909 Mr. Brock put a scheme, drawn up by this Association, for dealing with labour difficulties, in front of the U. P. A. S. I. Since then many resolutions and suggestions have been made but very little has been done. You have read what Mr. Hamilton said at the Meeting about the Zanzibar Government importing coolies from Bombay to work on its plantations, and also what was mentioned by Mr. Hughes about what the Straits Government are doing to help the planters there.

The matter is more serious than we realise and should not be trifled with any longer. We have done nothing to check organised labour agencies from off our very estates. We have felt surprised and alarmed when it has

occurred—but it can only be expected if we remain as we are now doing and take this sort of thing lying down. Your Association does not expect a perfected scheme to start with, but it does strongly advocate immediate action to check, even in a small way, the present unfair recruiting methods employed by outside agencies.

Knowing that you were prepared to go some lengths to support such a scheme, your delegates agreed on your behalf to subscribe to the U.P.A.S.I. on a two anna basis. We made it distinctly understood that we did so on the understanding that a workable labour scheme should be brought forward either at, or, before the next Annual General Meeting of the U.P.A.S.I. and proposed the following resolution which was carried:—

“That a Sub-Committee consisting of Messrs. Abbott, Brock, Hughes, Browne and Mahon with power to add to their number be selected to receive the opinions of the various planting Associations and to harmonise them if necessary and to circulate a working scheme to the District Associations before the next Annual General Meeting, with the idea of improving the labour position.”

The task allotted to the Sub-Committee is a very difficult one, but we may feel certain that they will make a start. A scheme of Registration was also put before the Meeting. This has since been published and your opinion will have to be given regarding the same.

Election of Members.—We voted for the members elected. The election of Mr. Abbott, as Chairman, for the second year in succession, was most popular.

We also voted for the nomination of Mr. Barber as Planting Member of Council.

The Meeting approved of the Report, and a vote of thanks to the delegates, Messrs. Marsh and Robinson, was proposed by Mr. Pascoe and seconded by Mr. Marden.—Carried unanimously.

Mr. Marden proposed, and Mr. Duncan seconded: “That the delegates be voted Rs.100 each, towards their expenses.” Carried unanimously.

3. *U.P.A.S.I. Registration Scheme.*—The meeting was of opinion that this was an excellent scheme as far as it went, and a move in the right direction, and they heartily supported the scheme.

4. *Hospital Affairs.*—As the Sub-Assistant Surgeon P. S. David had again returned to the Local Fund Hospital, the Honorary Secretary was requested to write to the President of the Local Fund Board and request that he be instantly removed. The Honorary Secretary was also requested to write to the Surgeon-General, Madras, and ask for an explanation as to why Sub-Assistant Surgeon Ibrahim Khan who had been ordered to this District according to order No. 296, had not arrived.

Mr. Simcock said that Government had refused him his applications for lands known as Blocks K₁ and K₃, explaining that Government had informed him that this Association had requested it to reserve these particular lands for public purposes. The Meeting did not know with what object Government had reserved the lands in question, and directed the Honorary Secretary to write to the Collector of Coimbatore to the effect that: “This Association defined the block of land that it requested Government to

reserve for public purposes, namely Block K₂, the boundaries of which are as follows:—

Situated between Estates Nos. 13, 7, 20, 8 and K₁, and that it never requested any land to be reserved for public purposes in Blocks known as K₁ and K₃. The Chairman was also asked to sign this letter to the Collector of Coimbatore.

5. *Subscriptions 1912-13.*—The subscriptions for the year having already been paid, the Honorary Secretary was requested to send out bills for the balance of enhanced subscriptions, and, in the meanwhile, to pay the Associations subscription, on the 2 anna basis, to the U. P. A. S. I. out of the Funds.

6. *Postal Affairs.*—The Honorary Secretary was requested to again remind the Post-Master-General of his letter No. 60 of date 29th September 1912.

7. *Election of Planting Member.*—The Honorary Secretary was asked to write to the Secretary, U. P. A. S. I. for proper voting forms.

8. *Roads and Communications.*—Colonel Ellis' suggestions were agreed to by the meeting, and Messrs. Marsh, Simcock and Robinson agreed to take up contracts for the roads in which their respective estates were interested. These gentlemen's names were to be submitted to Col. Ellis who should give the mileage to be taken up. As regards Bridle paths—it was unanimously agreed that the rates proposed for the upkeep of these Bridle paths, which had now got into such a bad state of repair, was quite inadequate, and an allowance of Rs.75 per mile, for the important Villoni Bridle path was suggested, and Rs.40 to Rs.50 per mile for the remaining district Bridle paths. Messrs. Duncan, Marsh, and Simcock agreed to take up the contract for the Bridle paths in which their respective estates were interested. Mr. Duncan spoke very strongly on the importance of the Villoni Bridle path, it being the only "Road" which Government had given to feed 4 estates of some 4,000 acres and it therefore deserved the serious attention of the P.W.D. when making allowances for the upkeep of Bridle paths.

It was unanimously agreed that owing to the District now becoming so large that it was already beginning to feel that the present means of transport into it was quite inadequate for supplying the labour with grain and supplies. The Honorary Secretary was requested to write to the Collector of Coimbatore and ask him about the right of diverting the Alliar River from above the falls of Lower Poonachi to the vicinity of the paddy fields below with a view of harnessing the same for electric power to work a wire rope-way up into the District.

9. *Access to New Estates. Converting of Government Bridle paths into Cart Roads.*—It was unanimously resolved that in the case of widening out, and constructing Government Bridle paths into cart roads, that all parties interested in Blocks fed by these paths should pay proportionately on the total area granted, and with regard to maintenance—the estates interested should pay proportionately on the area under cultivation.

That these Bridle paths remain as Bridle paths, and as Bridle paths only, to the public.

That in the event of other interests coming in afterwards and wanting to use these roads, *that they come in paying a pro rata* charge of the construction and maintenance.

That the construction of new roads, and the maintenance of the same, be treated in a like manner.

The Association was unanimous in thinking that the following Bridle paths be reserved for possible conversion into cart roads :—

1. Iyerpadi to Castlecroft and Sirakundra.
2. Castlecroft to Sirakundra.
3. Stanmore to Sirakundra.
4. Stanmore to Puthutote and Castlecroft cart road.

A sketch map of the proposed routes for roads to the new estates would be drawn up and submitted to the Collector of Coimbatore.

10. *Election of New Members.*—Messrs. Fowke, Hayne and Sampson were elected new members.

With a hearty vote of thanks to the Chair, and to Mr. Marden for his hospitality, the Meeting closed.

(Signed) HATTON ROBINSON,
Honorary Secretary.

The world's supply of rubber in 1911 amounted to about 76,000 tons (or 88,000 tons including guayule), nearly all of which was consumed; the production in 1910 was 70,000 tons. About 850,000 acres are now under rubber in the East, and about 80,000 acres in Mexico, Nicaragua and Honduras. Exports from Brazil, Bolivia, and Peru were 39,500 tons in 1911, against 40,500 tons in 1910; about 9,200 tons of guayule were exported from Mexico last year. Exports from Ceylon and India amounted to 2,750 tons, from Malaya 11,400 tons, and from the West African Coast about 15,000 tons.

Imports etc.. of all kinds of rubber into England were :—

		Imports.	Deliveries	Stocks, Dec. 31.
		tons.	tons.	tons.
1909	...	24,563	24,225	1,848
1910	...	32,659	29,980	5,231
1911	...	33,964	34,054	3,954

Imports of Pará (Manaos) rubber into England were 11,726 tons in 1911, 12,433 tons in 1910, and 10,179 tons in 1909; and of Peru (Cauchu) 3,753 tons in 1911, 5,577 tons in 1910, and 4,630 tons in 1909. Of East India and Malay plantation rubber, 10,656 tons were imported into England in 1911, as compared with 6,958 tons in 1910 and 3,607 in 1909.—*Journal of the Society of Chemical Industry.*

RULES FOR THE ELECTION OF AN ADDITIONAL MEMBER BY THE PLANTING COMMUNITY.

1. On receipt of an intimation that an election is to be held, the Secretary to the United Planters' Association of Southern India shall without delay send, by registration post, to the Secretary to each affiliated Planters' Association a notice that an election is to be held on or before such date as the Governor may appoint in this behalf.

2. Upon receipt of the notice referred to in rule 1, the Secretary to each of the said associations shall without delay send to each member of his association a notice that a meeting of the members of the affiliated association will be held at a specified place and time and on a specified date, which shall be not less than ten clear days before the date referred to in rule 1.

3. (1) At the meeting held under rule 2 each member of the affiliated association shall be entitled to give one vote for one candidate for election to the Madras Legislative Council.

(2) Any person not ineligible for election under these regulations who is a member of one of the Planters' Associations affiliated to the United Planters' Association of Southern India, shall be eligible for election.

(3) The voter shall record his vote on a voting paper, whereon he shall write the name of the person voted for and his full signature, and shall place the voting paper in a ballot-box.

(4) As soon as, in the opinion of the member presiding at the meeting, sufficient time has elapsed to enable the voting to be completed, he shall ask whether any member present has not yet voted, and shall call upon such member to vote within such time as the member presiding may fix.

(5) If there is no member present who has not voted, or on the expiry of the time so fixed, the presiding member shall open the ballot-box, count the votes and, after rejecting any voting papers not prepared in accordance with this rule, shall announce the result of the ballot to the meeting.

(6) In case of an equality of votes for two or more persons, the presiding member shall have a second, or casting, vote.

4. Immediately after the conclusion of the ballot under rule 3, the Secretary to the affiliated Association shall report the result thereof by registered post to the Secretary to the United Planters' Association of Southern India.

5. Upon receipt of the reports under rule 4 from the affiliated associations, the Secretary to the United Planters' Association of Southern India shall give to the vote of each of the affiliated associations the value assigned to it by the rules framed by the United Planters' Association of Southern India to regulate voting at general meetings of that body, and shall determine which candidate has received the largest number of votes as so valued.

6. In the event of two or more candidates for elections receiving an equal number of votes, as determined under rule 5, the Secretary to the United Planters' Association of Southern India shall report the fact without

delay to the Chairman of the said Association or, in his absence, to the Vice-Chairman of that Association and the Chairman, or Vice-Chairman, as the case may be, shall have a casting vote.

7. The voting papers given in at the meetings held under rule 3 shall be sealed up and retained by the Secretaries to the affiliated Associations for six months, and shall then be destroyed.

8. The Secretary to the United Planters' Association of Southern India shall forthwith report by registered post the name of the person elected to the Secretary to the Government of Madras in the Legislative Department, and the name of the candidate elected shall be published in the *Fort St. George Gazette*.

RUBBER

Canker of Hevea Rubber.

LECTURE TO KALUTARA PLANTERS BY MR. PETCH.

Mr. T. Petch said : I may congratulate the members of the Kalutara Planters' Association on the fact that it is now eight years since the Government Mycologist addressed them, I am not quite so certain how to regard the coincidence that the subject on which information is sought to-day, that is, Hevea canker, is the same as that on which you were addressed eight years ago. Of course, we have discovered more about the disease since then, but the main difficulty experienced by the planter appears to be still the more elementary point, how to recognise it. The outward indications of canker are, as a rule, not remarkably conspicuous—a slight darkening of the bark, or in more advanced cases an exudation of a brown, rusty liquid. But if any suspicious-looking patches are lightly scraped so as to remove only the outer corky layers, the indications of a canker, if present, are immediately revealed. On normal Hevea bark, the layer which underlies the cork is usually green, and the laticiferous layer is white, yellowish, or clear red. Consequently, when healthy bark is scraped, the first living layer met with is green, and if this is cut away the inner layers are found to be white, or clear red, or mottled red and white. But, when cankered bark is scraped, the layer immediately beneath the cork is black ; and if that is cut off the laticiferous cortex is seen to be a dirty red, which changes rapidly to dirty claret-coloured. Usually the discoloured patch is surrounded by a black line, and it is often mottled with black. I have here a painting which shows characteristic Hevea canker in its fully developed form after the outer layers of the cortex have been cut away. There is an earlier stage than this, in which the diseased cortex is a greyish yellow colour and appears sodden. These patches are usually surrounded by a dark line as before. Here is some possibility of making a mistake over the earliest stage. There are certain types of cortex which are greyish-yellow and yet not diseased. For example, there is a smooth-barked tree which yields very little latex and has a greyish-yellow cortex which is somewhat granular ; but, as that type of cortex occurs over the whole tree and yet the tree continues to flourish, it cannot be due to canker. There should not be any difficulty in distinguishing that type of cortex from early stages of canker, if it is remembered that the latter occurs in patches, clearly distinct from the general internal colour of the cortex. The

CLARET COLOURED STAGE OF CANKER

is unmistakable, and with a little practice the earlier state is equally readily recognised. There is no long interval between the two stages ; when I say

"earlier" I only mean earlier by a few days. The disease begins in the outer layer of the cortex and gradually penetrates to the cambium. At the same time it spreads up and down and round the tree. It travels more rapidly up and down than laterally, and in some cases forms a patch two or three feet in length on one side of the tree only. The wood beneath the canker patch is discoloured, but chiefly by fungi which follow the canker fungus. In diseases like this, the wood appears to be poisoned by the products of decay of the cortex rather than destroyed by the fungus which causes the disease. When the cortex and the outer layers of the wood are killed right round the tree, of course it dies. The diseased cortex is moist and has a peculiar smell. Boring beetles are often attracted by it, and we receive numerous samples of supposed damage caused by borers which turn out to be cases of canker. It is safe to say, on our present knowledge, that all the borers found in the stems of *Hevea* follow a previous attack of fungus disease of some kind, usually canker or pink disease. Cases of canker such as I have just described practically never show any cracks or scales on the diseased patch. The surface is quite smooth and unbroken, and the first thing the planter notices is that a brown liquid exudes, or the stem is attacked by borers. If the canker occurs between or along the tapping cuts, he may notice that the latex does not flow. No latex exudes from cankered bark, but, of course, that is not necessarily a sign of canker. But a tree should be examined for canker whenever the latex does not flow, especially if it flows from one or two cuts and not from the others. Two years ago I should have concluded my description of canker at this point. But recently other appearances of the disease have been noted. In the cases just described—what I should regard as the normal case—the disease, if untreated, progresses until the tree is killed; and the tree dies with its cortex unbroken. But I have seen several cases lately in which the tree has begun to heal itself; and in those cases the appearance (that is, after the healing process has set in) is not the same as in normal canker. From experience of *Heves* in Cacao, I have always opposed the idea that there could be any extensive self-healing, but from what I have seen this year I must admit that it can occur, at least in the low-country in a season like the present. Indeed most of the canker found at this date is in course of healing. The course of events in these cases runs as follows:—The fungus begins its attack on the outer layers of the cortex in the ordinary way. It produces the usual coloured patch, and penetrates, say, to half the thickness of the cortex. Then it stops, and the tree begins to cut out the diseased patch by a layer of cork cells. While the disease is advancing, the symptoms are just the same as those already described—the diseased patch is claret-coloured and soft. But, when the tree begins to cut the dead tissue, the appearance changes.

THE DEAD PART DRIES UP AND BECOMES BROWN

internally, and it forms a scale which can be easily removed. The inner side of the scale is usually moist and covered with a soft white layer. That layer is not fungus, but newly-formed cork cells. Beneath the scale, the cortex is healthy and yields latex, but its surface is usually rough. When the scale dries, it frequently cracks, so that the result is a cracked scaly patch, quite different from the canker in its progressive stage. It is often difficult to say whether a scaly patch has been caused by canker or not, once the scales have become dry. If a patch of dead bark is found embedded in healthy cortex, that is almost certainly a self-healed case of canker. At the present time it would be preferable to treat all scaly bark as possible old cases of canker. But the disease should be found at an earlier state than this. Why the fungus does not continue to grow and ulti-

mately kill the tree in these cases can only be surmised; personally, I should think it a result due to the weather, but it is open to anyone to argue that the fungus has become less virulent or the tree more resistant. I may here remark that, if the mycologist is to identify a case of canker from a sample of bark only, he must receive it within 24 hours of the time of taking it from the tree. If the sample is left on the verandah for two or three days, or if the V. A. motors it round the district and posts it at the end of the week, the diagnosis is a matter of chance. Of course, it would be possible to make a correct determination even in that case, given about a month's work on the specimen for fixing, embedding, section cutting, staining, etc.; but we cannot afford that, and it is quite unnecessary if the sample is posted immediately in a tin.

THE FUNGUS.

The fungus which causes canker is a *Phytophthora* a member of the same family as the fungus which is the cause of the most serious potato disease. It cannot be detected without microscope; it does not produce any large fructification or strands of mycelium as *Fomes semitostus* does. Here are drawings of various stages of the fungus. It permeates the diseased tissue, and ultimately puts out a small tuft of threads, which produce lemon-shaped bodies known as sporangia. These sporangia become detached, and are washed away by the rain or blown away to other trees. If the sporangium falls on a wet surface, its contents divide up into a number of small masses of protoplasm. Then the apex ruptures, and these masses are extruded. Each is provided with two threads, which are in constant movement, and with the aid of these it swims about the film of water. These bodies are called zoospores. Ultimately they come to rest, round off and enclose themselves in a cell wall, and finally germinate like ordinary spores. The germ tube, or primary thread, bores into the cortex of the Hevea, and so reproduces the disease. That is the typical life cycle, but there may be variations. The sporangium in some instances does not produce zoospores, but behaves as an ordinary spore. And under certain conditions, the fungus produces "resting spores" thick-walled spores—which preserve it through the dry weather. Such resting spores are formed within the diseased tissue. They carry the fungus over from one wet season to the next, but the chief means of spread during the wet weather is the sporangium and the zoospores. In addition to causing Hevea canker, the same fungus

ATTACKS HEVEA FRUITS,

and produces the well-known pod disease. It is to be expected, therefore, that an extensive attack of pod disease will be followed by an increase of canker. Arguing from analogy with the cacao disease, some part of the dying bark of green branches which occurs in connection with the pod disease is due to the same fungus, but that has not been definitely established. The fungus of Hevea canker is the same as that which causes Cacao canker, and the symptoms of the two diseases are practically identical. In cacao, however, where the fruits are borne on the old wood, the disease travels from the fruit into the stem through the stem of the pod. That does not occur in Hevea, or at least, the fungus does not travel from the fruit, down the branches into the main stem. I am often asked why canker should occur in districts where there is no cacao? Well, why did it ever occur on cacao? There is no doubt that it is a native fungus, and I believe that it is identical with the species which attacks bread fruit, but that point has not been proved by infection experiments. Another similar fungus attacks arecanuts in South India, but Coleman has proved that that is not the same as the one on Cacan.

THE METHOD OF TREATMENT.

advised in 1904 remains the only possible one. The diseased cortex must be cut out and burnt. Where the disease is discovered in an early stage, before it has penetrated right through the cortex to the wood, it is sufficient to scrape or cut off the cortex until healthy laticiferous tissue is reached. Such scraping can be done with a piece of hoop iron. If all the disease could be discovered in that stage, it would do very little damage. Where the wood beneath the patch is discoloured a thin shaving might be removed, but I do not think it is worth while to cut away much of the wood. Cutting away the wood, if done smoothly, will not do any harm, but in all probability it is not worth the time. In cases where the tree has healed itself, that is, where the cankered bark is scaling off, all scales of dead bark should be shelled out. The fungus in those scales is dead, but there may be resting spores there, and I have seen cases in which the disease has commenced again under the old scale. Of course, that may have been a reinfection; water lodges behind these scales, and in that way they form admirable points of attack for the fungus. It is often necessary to cut away any healthy bark in such cases; the scales shell out, and that remove all the dead diseased tissue. It would be well to paint the wounds with Bordeaux mixture, made according to the usual formula. If the wound does not extend to the wood, there is no necessity to cover it with anything; the tree very soon forms a protective layer of cork over it. If the wood is exposed, the wound should be covered with cow-dung and clay. Very large wounds should be tarred in the middle and plastered with cow-dung and clay round the edges. We are badly in need of some protective which can be applied to exposed wood without injury to the surrounding healthy bark. Tar undoubtedly kills the surrounding bark and to some extent retards healing; consequently, I do not think it can be safely applied to small exposures on the tapping surface. There appears to be some hope of success with the sediment from Bordeaux mixture, made adhesive by means of a resin compound. At present I should advise painting small wounds with Bordeaux mixture, and then covering with cow-dung and clay. When the wood has begun to decay it is often difficult to keep out boring beetles. Some flowers of sulphur mixed with the cow-dung and clay will prevent their attack to some extent. Some planters have used kerosene or bulk oil for that purpose, but my experience is that all oily substances soak into healthy Hevea bark and kill it.—*Ceylon Times*.

(To be continued.)

RUBBER EXPORTS FROM CEYLON.

The following statistics of the exports of rubber of domestic production from Ceylon during the years ended June, 1911 and 1912, have been extracted from official returns issued by the Ceylon Government:—

To	July-June, 1910-11. lb.	July-June, 1911-12. lb.
United Kingdom ...	2,888,032	5,712,339
United States ...	2,112,768	2,814,772
Other countries ...	427,280	1,566,907
Total Exports ...	5,428,080	10,094,018

—*Journal of the Society of Chemical Industry*.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Intimation having been received from the Government of Madras that the election of a Member of the Planting Community to the Legislative Council of Fort St. George should take place on or before December 16th, notices have been sent out asking Honorary Secretaries to convene meetings as early as possible. The Rules regulating the election of the Planting Member were published in this paper on November 2nd. It is an advantage to get the result of the election published as early as possible.

Continued and ended in this week's issue is Mr. Petch's highly interesting lecture on the Canker of Hevea Rubber.

A good deal of space is taken up in this issue by the correspondence between Mr. Scoble Nicholson, Ceylon Labour Commissioner, the Chairman United Planters' Association of Southern India, and Mr. Aylmer Ft. Martin through the Secretary.

Mr. Graham does not take a sanguine view as to the future of Coffea Robusta and Mr. McKenzie draws attention to the inevitable downfall of coffee in Brazil if despoiling the bush of foliage during the flowering season has persisted in.

A reply to the Resolution on Telegraphs, passed at the last Annual Meeting, is published from the Government of Madras, Public Works Department.

The Scientific Officer furnishes two articles of value to those interested in Camphor and Coffee.

Scientific Assistant for Coorg.—Mr. L. G. Jonas, the Scientific Assistant for Coorg arrived in Bangalore on 30th October, his boat being four days late. Under these circumstances the meeting at Mercara to welcome him has been postponed until November 14th. Mr. Jonas and the Scientific Officer will leave for Coorg on 11th November, making a short stay at Hunsur on the way, to inspect the Coffee Curing Works, etc., and in connection with the advent of Mr. Jonas, a paper published in the *Chronicle* of October 26th on page 586 under the heading of The Direct and Indirect value of Scientific Work, is of the highest importance to every District Association. It is to be sincerely hoped that in the near future every District Association will be employing one or more Scientific Assistants according to their acreage, under the direction of the Scientific Officer of the United Planters' Association.

A very bad case of a Labour Recruiter, absconding with a large sum of money has just been brought to the notice of the Secretary, who hopes with the sanction of the gentleman, who has been defrauded, to give fuller details next week and by publishing the recruiter's name warn others who may be intending to employ him.

CORRESPONDENCE.

Ceylon Labour Commission,

Trichinopoly, 10th September, 1912.

No. A/6671.

The Secretary,

South Indian United Planters' Association, Ltd.,

Bangalore.

Dear Sir,—With reference to the enclosed Circular which I understand, emanated from your Association for the information and enlightenment of coolies who are possibly seeking to emigrate to Ceylon and other countries, I would request your Association to be good enough to remove the document from circulation, seeing that as far as Ceylon is concerned in any case, it is not an accurate statement as regards the methods of Ceylon Recruiting. In this connection one of your members, Mr. A. F. Martin, was kind enough to call upon me on 24th August, 1912, informing me that he was closely connected with the authorship of the circular; he gave me to understand that he thought that your Association would at any rate remove anything considered objectionable that the circular contained in connection with Ceylon recruiting, and that he would, although he holds no official position at present in your Association, use his friendly influence to that effect.

I feel sure that it cannot be the wish of your Association to further any campaign that would place Ceylon in an unfair position, recruiting as we have done side by side for so many years quite amicably. As regards the methods of individual Ceylon recruiters, I may say, that it is only necessary for your Association to represent any unfair or irregular methods which have been or at any future period may be considered detrimental to the interests of Southern Indian recruiting, for them to receive my close attention and report to my Kandy Committee so that they may use their influence to put matters right. It is my intention, as Ceylon Labour Commissioner, to exercise my influence to prevent the distribution of circulars advertising Ceylon within the boundaries of your planting districts, and to prevent as far as possible recruiting in these districts. I trust that this being the case, your Association will see their way to withdraw from circulation a document which translated into the vernacular is calculated to adversely affect Ceylon recruiting by criticisms which as I have said before, are not applicable to Ceylon. Mr. Martin informed me that the circular in question was aimed at no country in particular but at the methods of native recruiters generally. I would point out that the contents of the circular may succeed in conveying that impression if taken in a wide sense, but if read from the vernacular by the coolie proposing to proceed to Ceylon it can only convey to him an absolutely false impression of conditions of labour in that country.

In conclusion I would point out that all coolies recruited for Ceylon who pass through the agencies of my Commission are fully informed as to their pay and prospects when working on our estates, and I would say that the methods of Ceylon recruiting generally speaking will bear a very thorough and searching investigation. I shall be glad to hear from you at an early date that your Association can see its way to fall in with the suggestion of Mr. Martin, undertaking to delete all objectionable matter from your circular. Indeed, I would go further than this and ask you in justice to a neighbouring

Colony with which the interests of Southern Indian Planters are, in a great measure bound up, to consider the advisability of recalling that circular altogether.

Yours faithfully,

(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

25, South Parade,
Bangalore, 11th September, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Trichinopoly.

Dear Sir,—I have to acknowledge your letter of 10th September, 1912, to which was attached a circular in Tamil. I am to-day despatching copies of your letter to Mr. Abbott, Chairman of the United Planters' Association of Southern India, and to Mr. Martin, and on receiving instructions from the former I will at once communicate with you.

Yours faithfully,

(Signed) FLETCHER NORTON,
Secretary.

25, South Parade,
Bangalore, 11th September, 1912.

C. E. Abbott, Esq.,
Chairman,

United Planters' Association of Southern India,
Meppadi P. O.,
Wynaad.

Dear Sir,—In accordance with para. 5 of the Memorandum of instructions given to me on August 19th, 1912, I beg to enclose copy of letter received to-day from the Ceylon Labour Commissioner, Trichinopoly, to which was attached the Labour Circular in Tamil to which the Commissioner refers. I do not forward this, as I presume you have one.

I am sending a copy of the same letter to Mr. Martin, and have asked him to place himself in communication with you, from whom I hope to receive final instructions as to how you wish me to reply. I am writing the Ceylon Labour Commissioner that I am referring the matter to the Chairman and Mr. Martin and will reply more fully at a later date.

Yours faithfully,

(Signed) FLETCHER NORTON,
Secretary.

No. A/6800.

The Secretary,

United Planters' Association of Southern India,
Bangalore.

Ceylon Labour Commission,
Trichinopoly, 12th September, 1912.

Dear Sir,—I am in receipt of your letter of the 11th September, 1912 and duly note its contents.

Yours faithfully,

(Signed) H. SCOELE NICHOLSON,
Ceylon Labour Commissioner.

25, South Parade,

Bangalore, 26th September, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Trichinopoly.

Dear Sir,—Referring to yours of the 10th instant and mine of the 11th instant in reply to it, I beg to inform you that the Chairman of the United Planters' Association of Southern India, to whom I forwarded a copy of your letter to me writes me as follows:—

"I have read Mr. Nicholson's letter of 10th instant sent with yours of 16th on the subject of the U. P. A. S. I. circular and the methods of Ceylon Recruiters. I hoped to get Mr. Martin to reply, but as he is away from his Headquarters I will try and explain our position in these matters.

"*The Circular*.—What Mr. Martin promised to do was to get the circular altered if Mr. Nicholson could *prove* that it was unfair to Ceylon. The Ceylon papers have merely called it bad names, and Mr. Nicholson's letter does not specify what particular statement is incorrect. Will he definitely tell us what it is he objects to? The circular was not intended to encourage emigration to Ceylon, but as Mr. Martin says, it was not directed against any particular country. It was published to show coolies that they could do better by staying in India than by going abroad.

"*Unfair Recruiting*.—The U. P. A. S. I. has never had the slightest personal grievance against Mr. Nicholson or his predecessor. But it is rather too much to ask us to treat the most atrocious case of crimping by some native sub-agent (who is repudiated by his own employer) as he and the Colombo Press ask us to, and behave as if we had detected some valued friend straying from the path of virtue, and merely utter a murmur of surprise and sorrow, or at most write in confidence to his employers or the Ceylon Association. What has happened in the particular case referred to does not encourage us to take this line. From the interview "The Times of Ceylon" had with Messrs. Carson that Firm appear to be blatantly unrepentant. As for the Ceylon Planters' Association it has done nothing to repudiate the remark in one of the Colombo papers that Mr. Goodfellow's methods were quite smart and that the Shevaroy Planters are a set of fools who ought to be ashamed of having complained of them."

I have only to draw your particular attention to the Chairman's sentence under the heading of Circular: "Will he definitely tell us what it is he objects to?"

On hearing from Mr. Martin I will communicate further with you.

Yours faithfully,

(Signed) FLETCHER NORTON,
Secretary.

25, South Parade,

Bangalore, 28th September, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Ceylon Labour Commission,
Trichinopoly.

Dear Sir,—The Chairman has sent me the following letter from Mr. Martin replying to yours of 10th instant, which I trust will satisfy you that

this Association is willing to consider any alterations you may wish to have made in the circular consistent with the ground it has taken up, on the question of Emigration beyond the sea.

This Labour question is one in which the whole planting community of Southern India is deeply interested, and with your permission, I should like to publish the correspondence in the *Planters' Chronicle*—the official organ of the United Planters' Association of Southern India.

Trusting you will permit me to do so.

I am, dear Sir,

Yours faithfully,

(Signed) FLETCHER NORTON,

Secretary.

Srivilliputtur,

Ramnad District, S. I.,

19th September. 1912.

The Chairman, U. P. A. S. I.,

Meppadi, Wynaad, Malabar.

Dear Sir.—With reference to Mr. Scoble Nicholson's letter which has come just as I am preparing to go into camp, my attention being thus divided, I fear I cannot do proper justice to it.

The Ceylon Labour Commissioner says the advertisement is not an accurate statement as regards the methods of Ceylon recruiting. He is already aware from me that the circular is not aimed only at Ceylon, but at all countries across the sea for which labour is recruited from S. India.

I gave Mr. Scoble Nicholson to understand if there was any particular statement in the advertisement which could be shown to be 'unfair' to Ceylon, I would use what influence I possess to have that statement altered or eliminated, Mr. Nicholson himself suggested the word 'unfair', and I thought it particularly appropriate as opposed to such words as 'objectionable' or 'offensive.' I also told him we would continue circulating the advertisement. It is quite true that for years, Planters in S. India and Ceylon have recruited side by side quite amicably. But ever since the enormous extension in the acreage of rubber in Ceylon, the recruiters for that country have introduced methods which are distinctly unfair to S. India. There could be no possible complaint on the part of S. Indian Planters, so long as Ceylon recruiters stuck to the Kangany system of recruitment, the patriarchal character of which is so well described on the first page of the report of the Ceylon Labour Commission, 1908.

There may be, and no doubt are, many estates in Ceylon still working under this excellent system, but speaking generally it has been abandoned, and 'haphazard recruiting' is now prevalent. See page XI of the report above mentioned. See also Goodfellow's circular. This change in the policy of Ceylon necessitated a change of policy on the part of employers of labour in South India. While recognizing that every labourer has a right to go where he thinks he can make the best living the U. P. A. S. I. approached the Madras Government with a view to (1) prevent advanced labourers leaving the country. (2) control emigration to such extent as to make sure that labourers going across the sea really understand the conditions under

which they will have to work. The Madras Government refused to take action on the ground that it was satisfied with the existing conditions. The U. P. A. S. I. were then forced to do what little they could for themselves, and it was decided to broadcast circulars setting forth the unfair methods of foreign recruiters, and the treatment of labourers once they had gone across the sea.

We are quite sure that in their own interests the Ceylon Labour Commission at Trichinopoly combat in every possible way, such unfair recruiting and unfair treatment. The points to which we drew the attention of the labouring population are quite beyond the control of the Ceylon Labour Commission. We do not see how the Ceylon Labour Commission can prevent Indian professional recruiters from lying nor Kanganyies from purchasing coolies at so much per head from these recruiters, nor control the 'tundu' system in Ceylon, by which coolies are sold from one estate to another, the price being fixed, not by the amount of money received by the cooly, but by the amount of the debt of their Kangany in which is often included (1) the cost of recruiting the coolies (2) the amount of money utilized by the Kangany himself, and probably (3) what is known as 'caddy debts' of the Kangany. The 'tundu' system may not have worked so unfairly under the old patriarchal Kangany system, but under the 'haphazard recruiting' system, it is only fair that coolies should be made aware of it before they leave South India. The action of the U. P. A. S. I. was forced upon it primarily by the change in Ceylon methods. We are of course thankful that it is the intention of the Commissioner to exercise his influence to prevent distribution of circulars advertising Ceylon and as far as possible to prevent recruiting within the boundaries of South Indian planting districts, but seeing the probable effect of our circularizing or attempting to recruit coolies within the boundaries of Ceylon planting districts, we cannot admit that the Ceylon Labour Commissioner's good offices in this respect, form sufficient grounds for our being asked to withdraw our advertisement. I would like to know what criticisms in that circular are not applicable to Ceylon—if they are unfair, they should, as a matter of course, be removed or altered. In issuing that advertisement we were careful (so far as it could affect Ceylon) to be guided, first by the Report and Proceedings of the Ceylon Labour Commission 1908, and secondly by information given more recently to the Ceylon Press by Ceylon planters. Such being the case we claim that the impression produced by the perusal of the U. P. A. S. I. advertisement on the mind of the possible emigrant to Ceylon, must be a fair and correct one, and in no way false. We have never aimed at any of the Ceylon Labour Commissioner's recognized agencies, where we have no doubt everything is done to inform coolies correctly, so far as pay and prospects are concerned.

The U. P. A. S. I. will, I hope, delete or alter any statement in the circular which is shown to be unfair to Ceylon, but we cannot agree to recall the circular altogether.

In adopting the 'haphazard' system of recruiting, Ceylon followed the lead of *all* other countries across the sea, but without introducing compensatory reforms in the position of the cooly on Ceylon Estates. The Straits Settlements Planters for instance start the cooly on the estate free of all debt,—and this compensates him, for the method of his recruitment in all respects except in the one of being trapped by false representations.

Yours faithfully,

(Signed) AYLMEYER Ff. MARTIN.

Ceylon Labour Commission,

Trichinopoly, October 10th, 1912.

Fletcher Norton, Esq.,

Secretary,

United Planters' Association of South India.

Dear Sir,—I am obliged for your letters of September 26th and 28th last which owing to pressure of work have escaped my acknowledgment.

I am giving the position my most careful consideration and will communicate with you later.

In the mean time, I should be obliged if you would refrain from publishing the correspondence in the *Planters' Chronicle* until such time as we have reached finality in the discussion which I sincerely trust will be satisfactory to both sides.

Yours faithfully,

(Signed) H. SCOBLE NICHOLSON,

Ceylon Labour Commissioner.

Ceylon Labour Commission,

Trichinopoly, 22nd October, 1912.

No. A/7975.

Fletcher Norton, Esq.,

Secretary,

United Planters' Association of South India,

Bangalore.

Dear Sir,—Adverting to my letter of 10th instant, I have read with interest Mr. Martin's letter to you of September 13th, and your letter of 26th September conveying to me the comments of your Chairman on my letter in which I asked your Association to withdraw from circulation a document which was calculated to be prejudicial to Ceylon recruiting in South India.

I cannot as suggested pick out any particular passage in the circular, as I consider the document as a whole if read in the vernacular by the indiscriminating coolie conveys to him an inaccurate idea of conditions prevailing on Ceylon Estates.

I regret that your Association is unable to comply with my request and such being the case there is nothing further to be said.

With reference to your Chairman's remarks under the heading of *Unfair Recruiting*, I can only repeat, that if on any future occasion, there are any grounds for complaint as to the unfair methods adopted by individual recruiters working for Ceylon, if your Association will be good enough to bring the matter to the notice of the Planters' Association of Ceylon in the usual way, it will of course receive their prompt and courteous attention.

In this special instance had the methods of Mr. Goodfellow, which you have called in question, been brought to their notice it could not have failed to elicit an investigation and the suitable notice of the Association,

with perhaps more satisfactory results than have been obtained through the medium of the press, which has not tended to improve the situation or to allay friction on either sides.

I would advocate that in future matters of moment between the two Associations should be freely ventilated by correspondence either direct or through this Commission, and I venture to predict that it will be conducive to the interests of both the Ceylon and South Indian Associations and will promote a mutual good understanding.

In this connection I should be very glad if an opportunity could be extended to me in order that I might meet your Chairmen and some of your District Chairman as I think that perhaps a free exchange of ideas will remove any misconceptions there may be to the attitude of Ceylon with regard to recruiting operations within the sphere of the South Indian Planting Districts.

Yours faithfully,

(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

25, South Parade,
Bangalore, 24th October, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Ceylon Labour Commission,
Trichinopoly.

Dear Sir,—I have to acknowledge yours of 22nd instant. I note that as you recognise that this Association cannot withdraw the Circular entirely as you requested, nothing further can be said. Having arrived at this conclusion no good purpose will be served by recapitulating facts recently stated in the correspondence. We shall be doing more good in searching for a means of working amicably side by side, and to gain this end, the consensus of planting opinion will be with us, and I agree with you that a meeting between yourself and our Chairman (and any others he would nominate) would clear the atmosphere.

I am sending a copy of your letter to him, and referring to mine of the 28th ultimo I should feel much obliged if you would permit me to publish the correspondence in the *Chronicle*, for the information of our members.

Yours faithfully,

(Signed) FLETCHER NORTON,
Secretary.

Ceylon Labour Commission,
Trichinopoly, 25th October, 1912.

Fletcher Norton, Esq.,
Secretary,

United Planter's Association of South India,
Bangalore.

Dear Sir,—I am in receipt of your letter of 24th instant and am glad that you find yourself in accordance with my views as to an amicable

settlement of differences that have arisen and which at any future period may arise in connection with the recruiting work of the South Indian and Ceylon Planters.

I have no objection to your publishing the recent correspondence in the *Planters' Chronicle* as you suggest.

I shall be probably proceeding to and from Ceylon during the first week of next month, but after that I shall be at liberty to attend any meeting that you are good enough to arrange in Bangalore.

Yours faithfully,
(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

October 30th, 1912.

To the Editor,
The Planters' Chronicle,
Bangalore.

Coffea Robusta.

Sir,—The first para. in your issue of October 26th, deals with this plant. In case any coffee planter may think that in South India planting districts "*Coffea Robusta*" is going to be a huge success I can tell them that I bought in February this year, 30 lbs. of it which cost 67.8 on the estate. It was put down immediately and the seed germinated very slowly indeed; at this date it has two pairs of leaves only, so it looks if it might take 20 years to crop.

I am, Sir,
Yours faithfully,
(Signed) J. A. GRAHAM.

Prospect,
Naduvatum, Nilgiris, South India.

October 30th, 1912.

Coffee in Brazil.

The Editor,
Planters' Chronicle.

Sir,—If it be true, as reported by a Brazil correspondent, that it has been found advisable that the coffee bushes be denuded of foliage during the flowering season; then the doom of the coffee bush is within measurable distance in Brazil. For this means such a very severe strain upon the reproductive functions of the coffee bush as can only last for a few years, when a pest like that of the *Hemilea vastatrix* will take possession, and we shall have a repetition of the history of coffee as occurred in nearly every coffee district in Ceylon and India. Coffee is not a product-machine, but it is a real organism possessing its own function upon the normal exercise of which its health and its life depend. "Bumper" crop year after year without any rest means a serious overstraining of its function of reproduction at the expense of other equally important functions. That a tree should be devoid of foliage during its flowering season is suicidal.

Yours faithfully,
(Signed) J. MCKENZIE,

No. 9633 C.

Government of Madras,
Public Works Department.

From

The Hon'ble Mr. S. D. Pears,
Ag. Joint Secretary to Govt., P. W. D.,
(Buildings, Roads & Railways),
Madras.

To

The Secretary,
United Planters' Association.
25th South Parade, Bangalore.
Madras.

The 30th October. 1912.

Sir,—With reference to your letter dated 10th September, 1912, I am directed to inform you that the Telegraph Department has now under consideration a scheme for reducing the cost of Branch Telegraph lines by erecting them with material lighter than that hitherto used which will include Public Telegraph lines to Planting Districts.

I have the honour to be,

Sir,

Your most obedient Servant,

(Signed) W. F. MOLESWORTH,
for Ag. Joint Secretary to Govt. P. W. D.,
(Buildings, Roads & Railways).

TEA.

Tea-drinking is becoming more and more popular in France and it is marvellous the change that has come over the working man in abandoning the liquor on which he had practically been weaned for the "cup that cheers." In some parts of France, notably in Brittany, cider is the drink of the labouring classes, and being so cheap a large sized bottle (a *litre*) containing more than a quart in English measure, costing only a couple of *sous*, every working man carries a bottle to work with him. In other parts a cheap red wine is equally favoured. Within the last few years, however, tea is to a large extent replacing the national drinks and the only reason why it is not more universally favoured is because of its cost. It is much cheaper in France to drink liquor than tea, which is retailed at the prohibitive price of four to five francs a pound.

The duty on tea in France comes to about a rupee a lb. or a franc and a half, so that the grocer who retails tea makes an enormous profit on the cheap stuff that he gets five francs or over Rs.3 per lb. A tea planter who has just returned after a long holiday in France was so struck with these facts that he has made arrangements to ship a good quality of tea to Brittany and retail it there at less than the local grocer charges for a much inferior stuff. He is convinced that there is a large field open to any firm that goes in for this trade on a large scale with the increasing popularity of tea in France.—*Capital*.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Camphor.—On page 357 *et. seq.* of Vol. VII of the *Planters' Chronicle*, a description of a Camphor Still was given. This was taken from a *Bulletin* published by the Agricultural Department of the Federated Malay States kindly forwarded by the Director. A great deal of interest appears to have been taken in the description of this Still, but one planter wrote to say that he could not get an estimate for the manufacture of the Still from the details published and the sketches forwarded to him and asked whether he could be put into communication with the makers. A reference to Mr. Lewton Brain, the Director of Agriculture in the Malay States has elicited the following kindly reply:—

"Regarding the Camphor Still which you wrote about in your letter 728/1912 of the 1st, ours was made partly by the Government Factory—partly by the Federated Engineering Company of Kaula Lumpur.

"2. I take it that you would only require the Still itself and the condenser made here, and would fit on your own boiler. Our present boiler is too large and is not economical.

"3. I have no doubt the Federated Engineering Company would quote you for a Still modelled on ours."

How to take Samples of Soil for Analysis.—The following simple rules are given by Dr. Olsson Seffer in *The Review of Tropical Agriculture* for May, and in all cases they should be carefully followed when a sample of Soil is taken to be sent to an analytical chemist for analysis:—

"Care must be observed in selecting the soils for Analysis as the surface soil is very much different to the sub-soil, and one part of the field varies from another.

"When we have an analysis made of our soils we want to know the condition of the entire field and not one part of it. The manner of taking these samples is as follows:—

"Having selected a piece of ground where the soil appears uniform in composition, dig a hole to the depth of one foot, making sure one of the walls of the hole is absolutely vertical: then take a slice of this vertical wall (about a spadeful taken in this manner will represent each layer of the soil), mix well and place in a central place. Several samples of the same sort at distances from each other, should be taken and then all mixed thoroughly together. Send at least 10 lbs. in a clean tin or wooden box. In case several samples are sent, each should be numbered, and the box marked with the name of the Estate.

"Samples should not be taken from recently manured ground, and great care must be taken to avoid such places when drawing samples.

"Information should be sent with the sample relating to the following questions:—

- 1st. The elevation and average rainfall.
- 2nd. General appearance and character of sub-soil.
- 3rd. What kind of drainage.
- 4th. Under which crops are the fields planted.
- 5th. Has any manure been used, and what kind.
- 6th. State any general particulars respecting the soil that may be considered desirable."

R. D. A.

COFFEE.

Annual Report of the Porto Rico Agricultural Experiment Station for 1911.

The following extracts from this report relate to Coffee:—

"The coffee crop during several years has varied with the character of the season. Comparatively little coffee has been planted, but there is better cultivation of the old plantings. There will continue to be an improvement in methods and in the quality of our coffee, but it is not likely that there will ever be any great extension of the industry in Porto Rico. It is true that the increased price of last year has given some encouragement to coffee growing, but other economic factors are causing a gradual change in the agricultural production of the island that is every year more manifest."

"In addition to the old plantings of Porto Rican coffee there are a number of introduced coffees. Of the latter there are something more than 2,500 trees. Among species of coffee other than *Coffea arabica*, in its different varieties, are found *C. liberica*, *C. laurentii*, *C. excelsa*, *C. macrocarpa*, *C. stenophylla*, *C. canephora*, *C. zanguebariae*, *C. dewevrei*, *C. liberica*, x *C. arabica* hybrid, *C. mauritiana* x *C. laurina* hybrid, and several coffees of undetermined species.

"The coffee trees in the transplanting experiment begun in August, 1909, are now showing some interesting differences. The plants used were seedlings from the 1908 crop. When quite small they were taken from seed boxes and set in the nursery bed.

"In transplanting young coffee trees from the nursery bed with only five to six pairs of leaves, careful setting with the root system bare gave as good results as with the root system encased in the surrounding clod. The tendency toward an earlier production was aided either by making the permanent planting when the trees were quite small, that is, less than a year old from seed, or by transplanting with the root system encased in the surrounding clod if the plants were allowed to remain in the nursery bed for a year longer. A more even stand is likely to be secured by allowing plants to remain in the nursery bed a year longer than by transplanting when plants have only five to six pairs of leaves. The cutting back and planting out as stumps of coffee trees less than 2 years old was very unsatisfactory where conditions were not very favourable for coffee culture.

"More time has been given to coffee diseases than to other subjects. In the work with the root diseases several new methods for preventing the trouble were tried, but it is yet too early to get definite results from these experiments. The diseases of the fruit, which make the preparation of the grain more difficult by causing the flesh to adhere, and which by spotting the grain, lower the quality of the product, have been studied and found to be due in part to improper shading and soil conditions. As the leaf rot spreads most rapidly at the time of the heavier rains, and its rapidly growing mycelium is especially sensitive at this time, it is important that sprays applied during this season should adhere well. For this purpose various adhesives were added to the Bordeaux mixture, among others the borax-starch mixture, which has been strongly recommended for use in cacao plantations in regions of heavy rainfall. Ordinary Bordeaux mixture made up with but half the usual amount of water without the addition of adhesives was found to adhere better than Bordeaux of the usual delution mixed with any of those adhesives tried."

R. D. A.

RUBBER.

Canker of Hevea Rubber.

(Continued.)

The only other point is whether anything can be done to *prevent* the attacks of the fungus. The fungus attacks the fruit, and may be expected to do so every wet year. It is impracticable to treat the fruit; but after a serious out-break of the fruit disease, the fallen fruit should be collected and burnt. It is rather a matter for congratulation that tapping so far as the evidence goes, reduces the number of fruits. Some years ago a planter patented a latex protector, intended to prevent rain water falling into the cups. More recently a rain gutter has been brought out to prevent the rain water running over the tapped surface. The patentee of the latter claims that he can continue the tapping through the wet weather and obtain more rubber *per annum*. Its chief recommendation from the present point of view is that it stops the constant flow of water down the stem from the crown, and in that way may prevent decay on the tapped surface and canker. The germination of any fungus spore depends upon the presence of moisture, but in the case of *Phytophthora* it is especially necessary that the sporangium should fall on a wet surface. If the stem could be kept dry, there would be practically no canker. Of course, I know that it is impossible to keep the stem dry owing to the lateral drive of the rain, but these rain gutters would keep off some of the water. I am strongly of opinion that it would be worth while to experiment with these on a fairly large area. I have already

INSTITUTED SPRAYING EXPERIMENTS

with Bordeaux mixture. Our chief aim should be to protect the potential tapping area from canker; because the wounds made in excising diseased bark interfere with future tapping operations: and the best method of protection would be to spray the stem in the dry weather just before the monsoon to a height of six or eight feet. I recommended that to South Indian planters for several years as a preventive of "Pink Disease," and it has now been carried out at a small cost. There is no doubt of its efficacy against any fungus which attacks the tree above the ground; the only question is whether it will have any effect on the rubber through traces of copper compounds washing into the latex. Experiments have been begun to decide that point. Bordeaux mixture dries on the tree, and the copper compounds, which are gradually dissolved by the rain, kill the fungus spores which may alight on it. The amount of copper on the tree is very small, and the quantity brought into solution at any given time is infinitesimal. Hence it would seem improbable that any appreciable quantity would get into the latex. Rough-barked trees appear to be attacked by canker more than those with a smooth bark, and the deposit of Bordeaux mixture in the cracks would be an effectual preventative. Spraying does not increase the proportion of scrap, nor does it stain the rubber, but I must wait until the rubber has been analysed before deciding whether it can be unreservedly recommended. In case spraying can be recommended, the following details may be given now: Solutions containing copper compounds must be made in wooden vessels. Only a few weeks ago I came across an instance in which the copper sulphate was being dissolved in an iron cauldron. If that is done the mixture contains no copper at all and it is quite worthless.

THE QUESTION OF SPRAYERS

is a difficult one. In a case like this, where it is desired to put as little copper as possible on the tree, sprayers must be used. If the mixture is

applied with a brush too much is put on. Moreover it takes a long time to paint a tree, whereas the stem can be sprayed in less than a minute. The type of sprayer generally used in temperate climates consists of a tank filled with the liquid which is pumped out as required; the operator carries the sprayer on his back, pumps with one hand and directs the jet with other. This is undoubtedly the best type; but it has always been stated in Ceylon that a cooly will not work with both hands. The Four Oaks sprayer is of that type; and as it has been strongly recommended in Southern India, it seems probable that the cooly difficulty has been exaggerated. Another type of sprayer is filled under pressure, and the cooly has only to direct the jet. But the sprayer of that kind used in Ceylon is not a success. As the liquid is under pressure, the slightest defect in the hittings of the jet results in excessive waste, and as much falls on the ground as is put on the tree. There is no means of agitating the liquid in the tank, consequently the copper compound settles and cakes at the bottom; and, as the pressure falls, it fails to drive out a large proportion of the liquid. But the most serious objection is that more than half the cooly's time is taken up with the process of re-filling. With the ordinary sprayer the liquid is simply poured into the tank, an operation which takes less than a minute; but the pressure sprayer requires anything up to a quarter of an hour. There is another type of pressure sprayer in which the liquid is poured in, and the pressure obtained by pumping in air; that is less objectionable, but with regard to waste it is as unsatisfactory as the other. Whatever sprayer adopted, it should be capable of being taken to pieces, especially the pump part of it. Personally I consider that the best apparatus is a Deeming pump fitted on a small barrel. That requires two coolies, but a greater quantity of the mixture can be taken, and less time is wasted in re-filling. The jet should be of the Vermorel type. The straight jets used in cacao spraying were made under a complete misapprehension of what was required in spraying operations.

COLLECTING SPOUTS SHOULD BE REMOVED

before trees in tapping are sprayed; if they are not, the latex collected immediately afterwards will be far more likely to contain copper compounds. (Laughter.) Finally I may once more urge the necessity of training two or three coolies to detect canker, and to treat it when it first appears. It is not a disease to be alarmed about, provided that it is treated in the early stages. I am confident that on the majority of estates a sanitary gang would quite repay its cost. The cooly proved quite efficient in detecting and treating cacao canker, and there is no doubt he would be equally capable of dealing with the same disease on Hevea. It was suggested, eight years ago, that the Mycologist should inspect every rubber estate once a year. That, of course, is physically impossible, if the inspection is to be of any value. Moreover, it is not the work of a mycologist. A mycologist has to investigate a disease, discover the cause, and prescribe remedies and when he had finished one, there are always others awaiting attention. If his time is taken up with the inspection of known diseases, investigation ceases. To a great extent, the two duties are incompatible, and in any branch the investigator can only inspect for the purpose of extending or completing his investigations: he inspects to obtain knowledge. What estates want is not a mycologist so much as an inspector who is fully acquainted with all the known diseases and can advise as to treatment. When the inspector discovered any disease which was new to him, he would bring it to the notice of the mycologist for investigation.

—*The Weekly Times of Ceylon.*

The Planters' Chronicle.

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[PRICE AS. 8.

THE U. P. A. S. I.

(INCORPORATED.)

A Meeting at Coorg.

A Meeting of the Coorg Planters' Association was held at Mercara, on 14th November, to welcome the Scientific Assistant for Coorg, Mr. L. G. Jonas, who has just arrived in India. In introducing him, the Scientific Officer, Mr. R. D. Anstead, B.A., spoke as follows:—

Mr. Chairman and Gentlemen,—It gives me much pleasure to be present at this meeting and joining with you in welcoming the Scientific Assistant to Coorg upon his arrival in this District.

If you will allow me to do so, I should like to make a few suggestions to you as to how you can best utilise your Assistant now that you have got him; and I will preface my remarks by reminding you that before a man can teach he must learn. You have decided, wisely as I most firmly believe, to supplement the Scientific Department of the U. P. A. S. I. by having a man of your own to look after your Scientific welfare and make a special study of your own particular problems. Those problems are many and I would ask you to remember that in addition to brains and energy, patience and time are necessary for their solution, and so I trust that you will not keep your Assistant constantly rushing about the District, but give him a chance to concentrate his energies on a few special problems at first and to do a little steady research work. One problem solved is worth more to you than half a dozen dabbled in and dropped to take up something else.

In my opinion the most important problem of all for Coffee planters is the manurial one and I trust that this will now be studied in a systematic way, from three points of view, what manures to apply, what quantities to apply, and when to apply them. I hope to see a number of definite experiments carried out in the field designed to answer definite questions. With the grant from the Kalisyndicate we have an excellent opportunity to begin work and I hope that this grant will form a nucleus round which a system of manurial experiments of a practical nature, will crystallise.

In the case of Ceará Rubber, Coorg is already in an advanced state of knowledge and I think that the immediate problems to study are how to increase the yield of the tree and to reduce the cost of production. With regard to the former there are two lines of study which I wish to suggest to you; first the influence of soluble fertilisers like Nitrate of Soda and Sulphate of Potash on the increased yield of latex, on which I had the pleasure of doing some preliminary work last year, and

secondly the possibility of increasing the yield by selection, thus getting a jât of tree which gives a higher yield of rubber than that usually grown now.

With regard to other crops I will say nothing now except that I am delighted to hear that a trial is about to be made with Tea. I feel sure that Tea would do well in some parts of Coorg, and perhaps I may be allowed to here sound a note of warning. Tea cannot be planted cheaply; the best seed of a suitable jât must be obtained and it must be well planted and I strongly advise those of you who are contemplating growing this crop to get men with past experience of Tea planting to come and start it for you at first. I have seen utter failure as a result of the opposite system in a new district and I do not want to see that happen in Coorg. I believe it has happened once already.

In addition to the problems already touched upon you have your own special problems. There is the ghost like poochie which digs holes in the field when no man is looking, a mystery I hope the Assistant may be able to clear up and a ghost I hope he will successfully lay.

One of the special problems with which Coorg is concerned is the tendency of the Coffee branches in some districts to dry up with their leaves and crop. This is probably not a disease but due to physiological causes. I have been doing some work on the problem lately and I am inclined to think it can be solved by handling the soil moisture correctly. The water which the Coffee uses is that which remains in the soil after drainage held in the form of a film of moisture around each particle of earth. In good soils this capillary water, as it is called, amounts to about 30% of the weight of the soil, and after it has dried out to about 12% plants are unable to use it. During the dry season loss of water takes place by evaporation from the ground surface as well as through the leaves. The water in the soil tends to maintain an even balance, when a portion dries out water moves to it from a wetter place and when the roots withdraw water from their immediate neighbourhood more water carrying plantfood in solution moves towards them. The rapidity of this movement of capillary water depends upon the size of the soil particles and the proportion of fine to coarse particles.

The chief danger which results from an unsuitable physical condition of the soil is poor drainage and lack of sufficient oxygen in the soil. Such a state results in the weakening and even the death of roots. In a badly drained soil which during the monsoon becomes waterlogged many of the feeding roots are suffocated and this process of suffocation is a rapid one. Again a surface feeder like Coffee suffers from want of oxygen for the roots when the surface of the soil becomes baked hard in the dry weather. The Coffee under these conditions loses its vitality and readily becomes a prey to insect and fungoid diseases.

These considerations led me to examine the physical condition of one of the Coorg soils where the Coffee suffers annually from this drying phenomenon. In order to do this a mechanical analysis was made of the soil, that is an analysis by which the soil particles of various sizes are separated out and the amount of each weighed. Such an analysis is arbitrary of course, but the commonly adopted sizes and terms are as follows:—Particles larger than 3 millimeters in diameter are called Stones, particles with a diameter of 3 to 1 mms. are called Fine Gravel, particles with a diameter of 1 to 0.5 mm are called Coarse Sand, particles with a diameter of 0.5 to 0.25 mm are

called Medium Sand, particles with a diameter of 0.25 to 0.1 mm are called Fine Sand, particles with a diameter of 0.1 to 0.5 mm are called Very Fine Sand, particles with a diameter of 0.05 to 0.005 mm are called Silt, and everything smaller than this is designated clay. (Specimens of these different constituents were exhibited).

Hall in his book on Soils points out that "the ease with which a soil allows rain to percolate depends upon the relatively low proportion of Silt and Clay rather than on the amount of coarse grained material; the fine particles pack in amongst the larger and the soil is equally resistant to the passage of water whether the finest material is diffused among coarse sand and gravel, or among the finer grades of sand. The shrinkage of a soil on drying, and its tenacity when dry are even more dependent on low proportions of coarse sand, humus and chalk than on the actual amount of clay and silt which cause the shrinkage. The really difficult soils to work are those containing less than 20% of sand above 0.1 mm. in diameter.

Now let us look at the mechanical analyses of three soils which I have made:—

	Good Coffee Leaf Disease.	Heavy bear- ing Coffee, Suffers from drying back.	Poor Coffee.
	1	2	3
Stones (Larger than 3 mms.) ...	0.3	0.1	1.3
Fine earth ...	99.7	99.9	98.7
	100.0	100.0	100.0
Moisture ...	3.3	3.6	6.7
Loss on Ignition ...	6.8	6.5	11.0
Calcium Carbonate ...	0.3	0.3	0.6
Fine Gravel (3 mm. to 1 mm.) ...	10.8	4.3	4.4
Coarse Sand (1 mm. to 0.5 mm.)...	15.6	11.7	8.6
Medium Sand (0.5 mm. to 0.25 mm.)	16.8	18.1	5.7
Fine Sand (0.25 mm. to 0.1 mm.)...	14.9	18.2	14.5
Very Fine Sand (0.1 mm. to 0.05 mm.)...	2.7	5.3	4.3
Silt (0.05 mm. to 0.005 mm.) ...	12.5	15.4	24.4
Clay (Less than 0.005 mm.) ...	14.6	15.6	18.1

It will be noticed that in all three soils the Calcium carbonate content is low. No. 1 contains 47% of sand as nearly 11% of fine gravel which makes it permeable to water and easily drained and worked while the silt and clay ensure a good capillary lift for the sub-soil water. The large proportion of sand however no doubt tends to make the soil fall together on drying and it probably dries out quickly to which the attack of leaf disease is due. The coffee grown on this soil is good as would be expected and presumably the leaf disease appears in the dry season. No. 2 contains much

less fine gravel and about the same amount of sand as No. 1 but the proportion of silt and Clay is higher. In No. 3 this is still further apparent the sand content being only 28%. In the last soil the moisture content is higher as would be expected and it probably has a tendency to become wet and sticky in the monsoon and to dry out hard on the surface and crack. I am inclined to think that the drying back of the branches is due to this poor soil texture and its tendency to cake. Liming and draining will have a good effect upon such a soil and a certain amount of cultivation is needed. This does not mean deep digging, however, but I think that soils of the type of Nos. 2 and 3 will greatly benefit by having the surface broken up to depth of 3—4 inches twice in the year, first after the heavy monsoon is over, that is in November, which is also the best time to apply manures, especially Nitrogenous manures, and again before the blossom showers, in March. The average rainfall of the district from which these soils were taken is as follows:—

January	... 0'07	July	... 13'20	
February	... 0'28	August	... 10'21	
March	... 0'61	September	... 5'05	Total 70'10
April	... 2'51	October	... 6'84	
May	... 5'15	November	... 2'01	
June	... 23'49	December	... 0'76	

The dry weather light dig is the most important. By doing this an earth mulch is formed which prevents the rapid drying out of the soil and such a mulch to be effective need not be very deep, about 3 inches being quite enough. The top soil should be loose enough to absorb and give the full benefit of the blossom showers. After a long dry period when the soil has become very dry and hard if the first rains are light most of the water runs off the surface and is carried away in the drains and small showers are lost in this way not only because the water runs off but also because the small amount which is retained is held so near the surface that it is quickly lost. If, however, the soil has been lightly broken on the surface even light blossom showers will all be absorbed and produce their full effect upon the coffee.

These are suggestions merely and my intention is only to indicate a line of work. I think that this is one of the many things which might be taken up by the Scientific Assistant and advanced with advantage. It lends itself to experiment and I would suggest that the texture and moisture holding power of the Coorg soils be studied together with the effect of Lime upon them and hot weather light digging not deep enough to cut the Coffee roots but sufficient to break up the top soil and establish a mulch and render the soil easily permeable to moisture. Probably not all types of Coorg soils need this treatment but it appears to me that soils in the neighbourhood of Santacoppa would benefit by it.

There is another point in relation to soil moisture which should be considered. It has been found in Victoria that Nitrification is inactive in soils where they contain about three times as much water as they possess in an average air dried condition. The best amount of water for Nitrification varies in different soils but ranges between 14 to 18% of the weight of dry soils and an increase of water above this optimum is as harmful as a decrease below it. Consequently if the working of the land in dry whether helps to keep the water in the surface soil this water may be very useful in the promotion of nitrification. The nitrate supply in the soil is reduced in two ways, by the consumption of the nitrates by plants and by the reduction of nitrification by bacteria due to the drying out of the soil. The

relation of this to weeds and green dressings and the time of year that they should be removed from the soil having dried it enough is a line of research which I commend to your notice and to that of the Scientific Assistant.

No doubt all this has a certain bearing also upon Leaf Disease. Aeration is needed to promote oxidation and the formation of nitrates and yet not acidity. This is promoted by a large proportion of sand, clay soils tending to remain wet, unaerated, and acid. Hence the application of Lime reduces Leaf Disease, as also does an application of Nitrate of Soda at the rate of say 2 oz. per tree just before leaf disease usually appears. To reduce Leaf Disease, Lime your soils, in the dry weather, and later on follow this treatment with Nitrate of Soda, or if oxidation is rapid, organic manures such as fish, cattle manure, and Composts. These latter must be acted upon by bacteria before the Nitrogen in them becomes available as soluble nitrates and these bacteria will only work in the presence of air and a base like Lime to combine with the Nitric Acid formed.

Gentlemen, it is now my pleasant duty to formally present to you Mr. L. G. Jonas and to ask you to accord him a welcome. That you will extend to him that kindly hospitality and courtesy which you have always so generously extended to me I feel sure, and that you will get on well together I hope. You will find Mr. Jonas full of enthusiasm and if you take him into your confidence and work in close co-operation with him I feel quite certain that you will never repent having established a Scientific Department of your own in Coorg.

It is impossible for me to speak on this subject without a feeling of deep regret, which I know you share with me, that one of the first promoters of the scheme which we see consummated to-day is no longer with us. It was as I know very close to Mr. R. D. Tipping's heart, and he would have rejoiced to see it so rapidly and I trust successfully carried out in his own District.

In conclusion I wish you Mr. Jonas, and you Gentlemen the very best of good luck.

RUBBER SUPPLANTING COFFEE IN SUMATRA.

Baron Autenried and W. Imhelder, who are the managers of two English plantations in Sumatra, recently arrived in New York. They are making a trip around the world, and timed their arrival in New York so they could take in the Rubber Exhibition. Baron Autenried has been in Sumatra 20 years, and has been growing tobacco, coffee, rubber or cocoa-nuts all that time. He said to a representative of the *New York Times* :—

"The production of coffee is decreasing. It now amounts only to a catch crop, being interplanted with rubber trees. As soon as the latter grow up, the coffee plants can get no sun, and therefore do not thrive. Still the prices of the Sumatra coffee that comes from our west coast are higher than Brazilian coffee. It has brought \$21.50 a hundredweight. Most of it goes to London.

"Of course, everybody out there seems to be going in more and more for rubber. The first trees were planted in 1899, and then in 1903 the great estates, many of which had been devoted to coffee raising, began to plant rubber. A little later came the rubber boom, when a great deal of English capital came in, and much new land was opened."—*The Spice Mill*.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Minutes of the Third Quarterly General Meeting of this Association held at Penhurst Bungalow. on the 26th October, 1912, at 10 a. m.

PRESENT,—Messrs. F. Bissett (Chairman), T. C. Forbes, (Vice-Chairman), J. A. Richardson, H. C. Westaway, J. H. Ellis, F. W. Winterbotham, F. E. Thomas, C. A. Mackenzie, R. St. George, W. A. J. Milner, G. L. Acworth and A. Slater, *Visitors*: and R. P. Roissier (Honorary Secretary).

The notice calling the meeting was then read.

The Proceedings of the last meeting were confirmed and taken as read.

The Chairman then welcomed Mr. Slater and also Mr. Acworth and said that the meeting would well remember that Mr. Acworth had been Honorary Secretary and Chairman of this Association and also Planting Member of Council.

Correspondence.—Read letters from the Superintendent of the Arnakal Grant in Aid Dispensary of the 6th August 30th August and 5th September. Read letter from D. McArthur, Esq., Manager in India Travancore Tea Estates Coy., Ltd., of 7th September. Read letter from the Durbar Physician of 6th September and 2nd October. Read letters from R. D. Anstead, Esq. of 17th September. Read letter from the Honorary Secretary, South Travancore Planters' Association of 6th September. Read letter from D. McArthur, Esq., Manager in India T. T. E. Coy., Ltd., of 6th August.

It was now resolved that the Honorary Secretary do write to all other Planting Associations in Travancore and ask them for their support in asking the Travancore Government to Legislate with regard to Estate Labour in Travancore only. There was a lengthy discussion on the question of Labour Legislation and Mr. Acworth was of the opinion that legislation was necessary and considered that we should be well advised to take Act I of 1903, several clauses of which he fully explained at the request of one or two members who wished for information. The Chairman then thanked Mr. Acworth for the information he had given us.

Tea Thefts.—Read letter from the Superintendent of Police No. 2417 of the 16th October 1912, and the Honorary Secretary was instructed to write and thank the Superintendent of Police for his letter and for all the useful information contained therein.

Scheme of Registration.—Read letter from the Secretary, U.P.A.S.I., of the 8th October *re* the Scheme of Registration. The Honorary Secretary had previous to the meeting sent a copy of this Scheme to each member of the Association. The Honorary Secretary was instructed to write to the Secretary, U.P.A.S.I., saying that we approve of the Scheme and that any suggestions will be offered later.

Bangalore Delegate's Report.—Mr. Chairman and Gentlemen,—I attended the U.P.A.S.I. Annual Meeting as your delegate. I will take the items of interest to this Association in the rotation in which they were discussed.

The Meeting lasted four days and opened with the Secretary's Report for the year. The Chairman's address then followed and the Scientific Officer's Report. All these have been printed in the *Planters' Chronicle* so I need not touch on them but would call your attention to the interesting report of the Scientific Officer.

Weights and Measures.—The Kanan Devan Planters' Association's delegate proposed a resolution which was carried unanimously asking that the Government of India be approached (through the Government of Madras) Mysore, Travancore, and Cochin that further steps be taken towards the general standardisation of all weights and measures in India. As no doubt you are aware this matter was brought up in 1910 when a similar resolution was proposed and carried and again in 1911 but no reply has been received from the Government of India. The Government of Mysore is bringing in an Act to standardize weights and measures so it is hoped that their good example will be followed by the other Native States and the rest of India.

Roads and Communications.—The Kanan Devan Association's delegate brought up the subject again of the Vagai Railway better known to us as the Cumbum one and proposed the following resolution:—"That this Association endorses the opinion of the Chamber of Commerce of Karachi and considers that the action of the Secretary of State is entirely contrary to the best interest of India and that the money at present invested at ridiculously small interest at Home could be much better utilized for the construction of light Railways and communication roads which are urgently needed in the interests of the community generally and suggested that in the event of Government being unable to immediately finance the proposed schemes they withdraw all opposition to private enterprise." In proposing this he mentioned that so far when Government were approached for help they had been met with the reply that it was difficult to get money for this purpose. It was hard to understand how this could be as it is stated that the Secretary of State for India had £18 million sterling lent out to favoured Capitalists at $2\frac{3}{4}$ to 3%. The K. D. P. A. had offered to guarantee this Railway scheme, but they were referred to the S. I. R., and the Madura District Board. The Government of India have practically given the concession to the S. I. R. and they have placed it fifth on their programme of construction so it appears as far off as ever. The following Associations voted in favour of it:—Mundakayam, Central Travancore, Anamalais, Kanan Devan, Shevaroy's and Nilgiris, the rest refraining.

Finance.—You will have seen the balance sheet for last year showing a credit balance of Rs.567-9-6, to which has to be added Rs.1,595-0-0 for subscriptions which had been omitted. The estimated revenue for 1912-1913 is Rs.18,067-5-1 including the above balance, and the expenditure Rs.13,569-7-1 which will leave a balance of Rs.4,497-14-0 to the good.

Planters' Benevolent Fund.—It was decided to keep this quite separate from Association's account in the Bank of Madras, and to avoid any possibility of its getting mixed up. The investments and funds will in future be kept in the Mercantile Bank of India and cheques drawn upon the fund will require the signature of the Chairman and Secretary of the U. P. A. S. I.

Planters' Chronicle.—It was decided to continue this as a weekly paper.

India Tea Cess.—The Association was in favour of renewing this for another period of five years. The Hon'ble Mr. Jackson gave some very interesting figures showing how that from 1894 when the voluntary Cess was started, the amount collected was £3,811 and the amount of Indian Tea exported was 129 million lbs. This went on till 1902 when the amount collected was £3,829, and the export of tea had risen to 181 million lbs. In 1903 the compulsory act was passed, and the amount collected that year was £17,861 and in 1910 £22,088, the exports of Indian tea rose from 181 million lbs. to 256 million lbs. in seven years, so these figures speak for themselves.

Pest Act.—The Indian Government have appointed a very strong committee to go into the matter, but before any local act can be brought in, it is necessary to have general legislation first. That is how the matter stands at present.

Fertilisers.—Mr. Anstead gave us a very interesting lecture on these which has been published in the *Planters' Chronicle*, so I need not touch on them.

Export Duty on Bones.—There was a long discussion on this subject, and it was proposed and carried unanimously that a small committee should be appointed to go into the matter, and submit a report before the next meeting. It was pointed out by Mr. Anstead who was the U. P. A. S. I. delegate at the Board of Agriculturists conference, that this question was then brought up. When the figures for the whols of India were considered they were so large, that those quoted for Madras were absurd. The balance of bones available for exportation was ten times as much as that consumed locally. He was then asked if an export duty was levied on bones, would the Planters of South India take the balance? The balance came to something enormous. He of course said "No" and was then asked why they wanted to interfere with an established trade? They took the figures for the whole of India, and for every million we quote they quote 40. There is therefore very little hope of Government considering the question of an export tax.

International Rubber Exhibition.—As requested I protested against the refund of the subscriptions, which has been given for this purpose. It was pointed out to me by the Chairman, that when the accounts were rendered, the Secretary had written and asked what was to be done with the balance of the fund? After the correspondence came in, somewhere about the end of October, a circular was sent out asking whether any of the Rubber Associations wished to support the New York Rubber Exhibition. The Secretary received no replies. When Mr. Richardson came out from England, another circular was sent proposing that a general exhibit to cover all the products of South India should be sent, and this again received very little support. The matter was then allowed to drop. As they had no right to use funds for any other purpose than that for which it was granted, the Planting Member of Council then went into the matter, and asked the Chief Secretary to the Governments of Madras what he would like done. That official said that they would take back the money if refunded. Mr. Hamilton strongly advised the repayment *pro rata* to all subscribers, and this was done.

Importation of Tobacco into Travancore.—I brought up this subject and proposed the following resolution:—

"That this Association do approach the Government of Madras with a view to tobacco being allowed to be imported by post into Travancore and Cochin and also to approach the Trades Association of Madras and obtain their support." Mr. Plowden seconded this, and it was carried.

The Kanan Devan Delegate supported this resolution and there is every hope that we shall be granted this concession.

Labour.—Mr. Hamilton drew the Association's attention to the fact that the Government of Zanzibar were recruiting labour to work on the Cocoanut gardens through the Government of India. The Madras Government had been approached on the subject by the recruiting officer but as they took no particular notice of the application, the recruiting officer went straight to the Government of India, who not only gave him permission to recruit in Northern India, but also approached the Government of Madras, and induced them to give a free hand in Southern India. So far as is known

a good many Sikhs and Moplahs have been recruited. It was also pointed out by the Kanan Devan Delegate, that as the facilities granted by the Federated Malay States to recruits was a guarantee of all expenses from the time of engagement to arrival on the Estates, a resolution was passed that the Government of India should be approached through the Government of Madras with a view to getting an explanation of the position they are taking up as regards the emigration of labour for Governments outside India.

Registration Scheme.—The circular in connection with this has already been distributed with a view to an expression of general opinion. A committee was appointed to receive the opinions of the various Associations and if necessary to harmonise them and circulate a working scheme before the next Annual Meeting.

Voting qualifications.—The rule as regards this was altered, and now reads as follows:—

“That every District Association be assessed at the rate of 8 pies per acre on the area under cultivation, represented by members of the Association. That a vote shall be given for every Rs. 10 subscribed.”

In conclusion, gentlemen, I must thank you very much for the honour you did me in electing me your delegate.

The Chairman proposed a vote of thanks to Mr. Westaway.—(Carried with applause.)

Sri Mullam Delegate.—It was proposed by the Chairman that Mr. Westaway be asked to represent this Association at the forthcoming Sri Mullam Assembly. Seconded by Mr. Richardson and carried unanimously. Mr. Westaway then thanked the members for electing him as their Delegate. It was resolved that the Committee instruct the Delegate at a later date.

Finance.—It was resolved that a further call of $1\frac{1}{2}$ anna per acre be made on this year's subscription to meet expenditure.

Read letter from the Secretary, U. P. A. S. I. of the 27th September. Proposed by Mr. Westaway:—“That this Association fall into line with the majority of Associations belonging to the U.P.A.S.I. and pay 2 annas per acre subscription but protest against the voluntary subscription ranging from 8 pies to 2 annas as it does away with the resolution unanimously carried in 1910 placing all subscriptions on a uniform basis.” Seconded by Mr. Richardson and carried unanimously. It was resolved that the Honorary Secretary send a copy of this resolution to the Secretary U.P.A.S.I. and also to the Honorary Secretaries of the Kanan Devan, Malabar and Mundakayam Associations.

Motor Transport.—This was referred to the Motor Transport Committee and it was resolved that the Committee attended the meeting of the Mundakayam Rubber Planters' Association on the 2nd November with a view of discussing this Scheme with the Mundakayam Committee.—Carried.

Labour Rates.—These as drawn up by the Labour Rate Committee were circulated in the room and the discussion on these rates was postponed till after the next Committee meeting.

Arrack Taverns.—It was resolved that the Honorary Secretary write to the Excise Commissioner and ask for the removal of the Arrack Tavern at Kottikanam.—Carried.

Mr. Richardson proposed that as Mr. Leahy, Ex-Chairman of this Association, and who is now in England, is getting married on the 30th October, a cable be sent to him sending the congratulations of this Association. Seconded by Mr. Westaway and carried with applause.

With a vote of thanks to the Chair the Meeting terminated.

(Sd.) REGINALD P. ROISSIER, *Hon. Secretary.*

CORRESPONDENCE.

Srivilliputtur,

Ramnad District, S. I.,

2nd November, 1912.

To

The Editor,

Planters' Chronicle,

25, South Parade, Bangalore.

Dear Sir,—If you have not already published these figures, they may interest your readers.

Yours faithfully,

(Signed) AYLMER Ff. MARTIN.

The number of persons born in South India and enumerated in Ceylon during the 1911 Census is as follows:—

Trichinopoly	...	102,317	of whom	92,929	are engaged on Estates.
Madura	...	82,105	"	62,351	" "
Tanjore	...	60,119	"	48,237	" "
Salem	...	39,250	"	34,967	" "
Tinnevely	...	70,391	"	31,484	" "
Pudukotah	...	17,896	"	15,871	" "
North Arcot	...	17,321	"	15,692	" "
South Arcot	...	13,098	"	11,867	" "
Coimbatore	...	9,273	"	8,256	" "
Mysore	...	8,189	"	6,506	" "
Madras	...	10,689	"	6,294	" "
Chingleput	...	6,603	"	6,218	" "
Travancore	...	6,868	"	4,984	" "
Malabar	...	11,734	"	3,636	" "
Krishna	...	1,571	"	1,382	" "

Anantapur, Bellary, Cochin. Cuddapah, Ganjam, Godaveri, Kurnool, Nellore, Nilgiris, South Canara, and Vizagapatam give less than 1,000 each.

There are only 679 persons born in South Canara, living in Ceylon, of whom 637 work on estates. A look at the Map will show that the eastern half of the Peninsula south of the latitude of Madras supplies Ceylon estates with the vast majority of their labour, about 300,000 persons out of a total of about 360,000

The figures are taken from the Estate Statistics of the Census of Ceylon 1911 by E. B. Denham (of The Ceylon Civil Service).

(Signed) A. Ff. MARTIN,

The Planters' Stores and Agency Co., Ltd., Agents for Messrs. Davidson and Co., Ltd., of "Sirocco fame." have received a cable this week from Belfast, announcing that the price of all "Sirocco" Tea Machinery will be increased 5 per cent., the increase to take place on and from the 1st November next. We understand this increase is due to the enhanced rates for raw materials, extra cost of skilled labour, and a general increase in the cost of manufacture in all departments.—*Capital.*

TEA.

INDIAN TEA.—The dearer tone which prevailed last week was well maintained at Monday's auctions, when all descriptions were well competed for. At Wednesday's sale the stronger feeling was even more accentuated, and a further advance took place. Useful medium descriptions among both Broken Pekoes and leaf kinds were in good demand, and the better liquoring sorts were more difficult to buy. Tippy Teas also were steadily supported, but were in many instances inferior in colour and appearance to recent offerings. The India Tea Association's telegram of October 4th reports generally unfavourable weather conditions and a poor out-turn from the Cachar and western Dooars districts. Other out-turns have been normal, with only fair prospects in Assam. The following are the figures in September:—Imports, 27,22,000 lbs. against 26,795,000 lbs. Deliveries, 14,063,000 lbs. against 14,604,000 lbs.; while the stock stands at 48,779,000 lbs. as compared with 40,355,000 at the corresponding period in 1911.

CEYLON TEA.—There was a further falling off in the quantity offered at the auctions on Tuesday, and, with an active demand, the market was dearer. The lowest grades of whole leaf, which have until recently been quite neglected may be quoted $\frac{1}{4}d.$ per lb. higher, while the better liquoring Pekoes and Orange Pekoes frequently showed an advance of $\frac{1}{2}d.$ to $1d.$ Broken Pekoes up to about $7d.$ were very firm, and above that figure mostly $\frac{1}{4}d.$ to $\frac{1}{2}d.$ dearer, the finest descriptions showing a still greater rise. At the public sales 22,383 packages were brought forward, nearly all of which were sold.

CHINA TEA.—Very attractive value is now offered in fair liquoring Monings from $5\frac{1}{2}d.$ to $7d.$, and a considerable quantity has been sold. Merchants have been willing to meet the market and accept lower prices, and the effect has been that Kintucks from $9d.$ to $1s. 1d.$ have received more attention from the trade. The demand, however, is not very general, although present prices are likely to induce buyers to secure stocks while these cheap Teas are available.

LONDON TEA RETURNS.

	Duty Paid.		Export.	
	1911.	1912.	1911.	1912.
	lbs.	lbs.	lbs.	lbs.
For week ended October 5th ...	5,968,101	5,690,141	912,406	1,183,358
For 40 weeks ended October 5th ...	199,718,884	198,783,559	35,417,770	35,021,019

OFFICIAL STATISTICS OF THE TEA TRADE OF THE UNITED KINGDOM.
One Month ended September, 30th.

	1910.	1911.	1912.
	lbs.	lbs.	lbs.
Imports—			
India ...	24,460,260	28,501,467	26,688,491
Ceylon ...	6,872,432	8,082,379	8,747,225
China ...	2,518,065	4,986,278	2,851,230
Other countries ...	2,318,146	2,072,433	3,002,326
Total imports...	36,198,903	43,642,557	41,290,272
Home consp. ...	24,274,425	25,090,971	23,890,608
Exports ...	4,116,704	4,534,886	4,735,647
Total deliveries...	28,391,129	29,625,857	28,626,255
Stock on Sept. 30th. ..	97,621,000	89,823,000	109,836,000

OFFICIAL STATISTICS OF THE TEA TRADE OF THE
UNITED KINGDOM.

Nine Months ended September 30th.

	1910.	1911.	1912.
	lbs.	lbs.	lbs.
<i>Imports—</i>			
India ...	95,331,202	96,531,140	102,967,515
Ceylon ...	86,425,416	82,994,873	90,310,334
China ...	13,383,380	17,641,340	16,038,947
Other countries ...	19,036,071	20,503,347	28,580,908
Total imports...	214,176,069	217,670,700	235,897,704
Home consp. ...	212,504,341	216,467,088	217,439,319
Exports ...	35,050,760	34,900,176	34,816,245
Total deliveries...	247,555,101	251,367,264	252,255,564
Stock on Sept. 30th. ...	...	...	...

—*The Produce Market's Review.*

To Hanwella Estate belongs the distinction of being the first to turn out Ceylon hard fine Pará. Mr. H. A. Wickham, who contends that the difference between Brazilian hard fine Pará and plantation rubber is only a matter of treatment, has given a demonstration on the estate, and the results have turned out quite satisfactory, and are to be seen in the premises of the Colombo Commercial Company in Slave Island. The rubber has been turned out in the shape of blocks, and is believed to be equal in every respect to fine hard Pará, consisting as Mr. Wickham says, not of a curd or coagulation from latex but of an amalgam of the whole of the latex with the preservative smoke. The opinion of the market on the rubber will be awaited with interest. Mr. Wickham says that he found plantation latex, if anything, richer than that produced on the Amazon, and, similarly treated, ought to form superior not inferior rubber. — *Commerce.*

At Tuesday's Colombo tea sale the demand was moderate. Light liquoring Brokenes were irregular and weaker. Good medium Brokenes and Orange Pekoes remained firm at last week's rates, while Pekoes showed some advance. Common kinds ruled firm, and commonest were in rather better demand. Dusts and Fannings continued strong. Selection fair, but with declining quality. Total quantities dealt with:—Black tea, offered 1,418,948 lbs.; sold 1,161,172 lbs.; compared with 1,396,048 lbs. and 1,255,342 lbs. last year. Green tea offered 30,947 lbs.; sold 17,398 lbs.; compared with 49,455 lbs. and 445,970 lbs. — *Commerce.*

COFFEE.

This month is nearly always a critical time in Brazil. Following what is reported to have been a poor September flowering, a satisfactory October would alter the position, but further unfavourable flowering would almost assuredly point to another small crop. It is well, however, to bear in mind that the record crop was grown when all reports from Brazil up to the beginning of November were much the same as this year, stating that frost had destroyed young trees and drought was adversely affecting the older ones. With good ordinary Santos fetching 75s., it is only natural that grocers all the world over will not buy more than is needed for their immediate wants, the margin for a fall being so much more than for a further rise. Other Coffees have been in small supply and have sold well at rates favouring importers rather than the buyer. Rather more enquiry has been noticeable for East India, and its relative cheapness is becoming more apparent. A small sale of Costa Rica on Thursday contained two marks which were said to be from the new crop, and gave evidence, by the smallness of the berry, that the drought there has been very severe.

LONDON COFFEE RETURNS.

	Home Consumption.		Export.		Stock.	
	1912	1911	1912	1911	1912	1911
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
For week ended October 5th ...	295	371	576	602	12,452	13,216
For 40 weeks ended October 5th ...	12,855	11,701	12,682	26,169	...	...

OFFICIAL STATISTICS OF THE COFFEE TRADE OF THE UNITED KINGDOM.

One month ended September 30th.				
	1910.	1911.	1912.	
	Cwts.	Cwts.	Cwts.	
Imports ...	32,654	59,369	40,303	
Home Consumption ...	22,546	22,148	19,864	
Exports ...	78,571	40,918	33,660	
Total deliveries...	101,117	63,066	53,524	
Stock on September 30th ...	526,000	291,000	262,000	

Nine months ended September 30th.				
	1910.	1911.	1912.	
	Cwts.	Cwts.	Cwts.	
Imports ...	792,132	632,116	567,551	
Home Consumption ...	202,614	198,300	197,381	
Exports ...	595,084	568,109	319,173	
Total deliveries...	797,698	766,409	516,554	
Stock on September 30 ...	...	...	...

RUBBER.

The Manuring of Rubber Estates.

In recent issues we have given the views of planters and directors on the subject of thinning-out Hevea estates, believing that the treatment of closely planted areas is one of the most difficult problems before cultivators. Next in point of importance is the subject of manuring. It has been argued that *Hevea brasiliensis* is such a hardy tree and greedy feeder that it will flourish even among rocks, and expenditure on manuring need not therefore be considered. It is certainly surprising to find this premier rubber tree giving such satisfactory returns in countries and districts in each country where soil and climate factors exhibit marked differences. Hill-sides, flat plains, drained swamps, volcanic soils, gravelly and stony terraces, and other types of land appear to provide sufficient nutrition for the rapid and continuous growth of Hevea trees. It is not to be wondered at that manurial operations have not even been considered by owners of trees planted on some of the rich alluvial soils of Malaya, or the volcanic soils of Sumatra and Java. But even in these instances, we believe, the question will have to be seriously handled when crops are dependent upon secondary, tertiary and subsequent bark.

MANURING OTHER TROPICAL PRODUCTS.

A very instructive lesson can be learnt from the experience of planters dealing with other products in countries where rubber trees are also grown. Probably the best example is furnished by the tea-planting industry in India, Ceylon and Java. There are many estates which have raised their output per acre, per annum, from 300 to over 600 lbs. by the application of manures at regular intervals. The effect of separate and mixed manures has been determined on so many types of soil that it is comparatively easy to raise the yield by definite increments of 50 lbs. per acre by selecting certain manures and applying a specified quantity to the soil at definite intervals. There is probably no tropical industry which is so dependent on the application of manure as tea is to-day, and it is questionable whether many estates could show a reasonable profit if manuring was entirely dropped.

It may, quite reasonably, be argued that the results obtainable with a leaf product such as tea are no guide to those which might accrue from the same treatment of rubber. But it can be shown that manuring has a beneficial effect not only on leaf, but on fruit and bark products. The effect of manures on fruit crops—cocoanuts, cacao and coffee—is not always so obvious as in the case of tea, but it is now common knowledge that judicious manuring does increase the crop, and in many instances is absolutely necessary. Cacao in Ceylon and the West Indies would occupy a poor position without the adoption of good cultivation and manurial operations. The high yields now obtained from cacao trees in Samoa and San Thome show the value of a good supply of food in naturally rich soils, and compare very favourably with the smaller annual crops from Ceylon estates on poor soil.

EFFECT OF FOREST VEGETATION.

Unlike tea, cocoanuts, coffee, and even cacao, rubber plants grow into trees of enormous size, and themselves form a dense forest. As remarked elsewhere the soil under forest vegetation of any type improves "in mechanical and chemical composition with age, owing to the protection which the trees afford to the soil, to the action of the roots, and the accumulation of leaf-mould. The annual fall of leaf from Hevea rubber trees

ultimately effects an improvement in the soil in which the trees are being grown. This is borne out by the analyses of the soils at Henaratgoda, the results proving that the organic matter, potash, and nitrogen are greater in the soil which has been under rubber for twenty-nine years than that maintained under pasture; the lime and magnesia have decreased under the old rubber, while the phosphoric acid is the same under both conditions."

But these improvements do not justify any proprietor in declining to assist nature, and to supply still more good to the growing tapped trees.

EFFECT OF TILLAGE ON HEVEA.

Where the soil is naturally very rich, it is granted that the turning over of the soil by forking or chankolling, will have as great an effect as the actual application of manures on other soils. It must also be admitted that there are also many estates where the soil is so rocky or stony as to render forking almost impossible, and where cultivation is therefore necessarily limited to the application of more or less readily soluble manures.

In tillage operations several points have to be borne in mind. In the first case it must be remembered that the destruction of Hevea roots may increase the amount of dead organic matter in contact with living roots, and therefore considerably increase the risks from diseases in this and other ways. It is quite clear that if root destruction is unavoidable the roots must be cleanly cut and not torn; the depth to which different soils need tilling will determine whether that operation can be best done by forking or chankolling.

EFFECT OF MANURES ON HEVEA.

It might be imagined, if we are to accept the dictum that latex is mainly an excretory or useless product, that manuring would have no beneficial effect. But even if it were a waste product, manuring would, since it increases the rate of growth of all parts, affect the chemical changes going on within the plant, and with the increased activity in living parts there would be a corresponding increase of waste products.

Manuring of rubber trees is, however, on quite another basis. The application of manure is followed by a more rapid growth of all parts of the plant, the bark included. Now the "bark is the mother of rubber." The greater the weight of bark the larger the number of latex tubes, and therefore the greater the weight of rubber. You cannot have the bark of healthy *Hevea brasiliensis*, *Mauihot Glaziovii*, *Castilloa elastica*, *Ficus elastica* or *Funtumia elastica* trees, without latex. Latex is present in the bark of healthy trees, and if removed from any particular part it soon accumulates, until approximately the old equilibrium is reestablished in the affected area. If more bark is formed as the result of manuring, it will assuredly become filled with latex like the renewed bark which takes the place of that removed during paring operations.

NECESSITY OF MANURING.

It being taken for granted that manuring does stimulate the growth of the plant, and that a total increase in plant tissues means an increase in the rubber content, it now remains to prove that an increased rate of growth is desirable. It is asserted by many that there is a maximum rate of growth in all plants which it is not desirable to exceed. It is common knowledge that manures can "force" plants, and that the resulting specimens may be really weak and unable to stand well against the ordinary variations of environment or the attacks of pests and diseases. I have even heard the view expressed that each species has a life of its own which it is impossible

to really lengthen, and that forcing of growth means a shortening of the life of any specified plant.

Given a widely-planted Hevea estate in fair health on good soil, there is certainly no urgent need for manures of the artificial or readily soluble type in the early stages. But we doubt whether even on our best estates there is that uniformity which would obviate the necessity for special attention to individual trees. The best of estates always possess several trees, on every acre, which are backward in growth on account of local poorness of soil or feebleness of the plants; supplies alone are invariably responsible for irregularities in growth over a considerable acreage. In all such cases we would advocate the use of manures.

There is, when we view the rubber planting industry in its widest sense, no doubt as to the necessity of manuring and tillage. Estates have been planted on poor soil, at high altitudes, and in uncongenial climates; others have been planted at close distances, and after thinning-out the remaining trees present a backward appearance. Numerous estates are not able to tap the renewed bark because it has not grown so rapidly as was expected, and monkey tapping, V tapping on restricted areas, and other methods have been resorted to. There would be no difficulty in quoting a large number of estates possessing trees which badly require either a good rest or extra food to stimulate the rate of growth.

EXPERIMENTS BADLY NEEDED.

Those proprietors who admit the necessity of manure are sometimes ore ly perplexed, because there is very little information of a reliable character respecting the components and quantities of the different ingredients which should be applied. It is true that experiments have been made in Hawaii, Sumatra, Ceylon, Malaya, but in no case can we confidently accept the results for general guidance.

We do not see why the agricultural departments in Ceylon, Kuala Lumpur, and Singapore, should not commence a definite series of experiments with the object of determining the effect of various manures on trees of different ages. Very valuable work has been done on these lines by the tea planters of Ceylon and India, and the results have been largely acted upon in those countries. Such experiments would have a special value for those countries where the soil is admittedly deficient in plant food, and where proprietors of close-planted estates are working in the belief that such properties can, with manure, permanently carry considerably over 100 trees per acre.—*The India Rubber Journal*.

MANIPULATION OF "JAVA" COFFEE.

(From Consul Frank W. Mahin, Amsterdam, Netherlands).

In response to an inquiry from the Department of Agriculture at Washington I have investigated the reports that an impure Java coffee is being exported from here to the United States. It is stated that owing to keen competition a secret practice of "manipulating" Java coffee has grown up, such coffee being exported largely to South Africa and some to the United States. The process is merely selecting good-sized Santos beans, putting them through a little machine, and polishing and painting them to give them the colour and appearance of the real Java. This is known in the trade as "manipulated Java," which may be wholly or partly made up of inferior kinds. For shipments to the United States it is inferred that the article consists of a mixture of real Java with inferior beans. Outside the trade the coffee is known as Java.—*The Spice Mill*.

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DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

*Proceedings of a General Meeting held at the Meppadi Club,
on November 6th, 1912.*

PRESENT.—Messrs. Egan, Gillatt, J. C. C. Parker, G. R. C. Parker, Powell, Vernede and C. E. Abbott, (Honorary Secretary.) *Visitors:* Mr. Cammeade, Divisional Magistrate, Doctor Milton, and Mr. Briggs,

Mr. J. Carson Parker in the chair.

1801. *The Proceedings of last Meeting.*—These were confirmed.

1802. *The Proposed Grant to Meppadi Club.*—The Proceedings of a General Meeting of the Meppadi Club held on October 2nd, 1912, were laid before the Meeting. Proposed by Mr. Egan, seconded by Mr. Vernede, and carried unanimously, "That a grant of Rs.1,000 be made to the Meppadi Club from the funds of the Association for the purpose of carrying out the suggested improvements."

1803. *Grant to Meppadi Church.*—Proposed by Mr. Gillatt seconded by Mr. Egan and carried unanimously: "That a grant up to Rs.250 be paid from the funds of the Association derived from the sale of the "Westward Ho" Bungalow for the repairs of this Church."

1804. *Rules of the Association.*—Resolved: "That Rules 5, 7 and 18 be altered to suit the resolutions passed on October 12th, 1910 and January 14th, 1912, and that the Committee report to the Annual General Meeting in January."

1805. *Mr. Marden's Registration Scheme.*—After considerable discussion the following resolution was passed unanimously: "That this Meeting is unable as yet to commit absent Proprietors to the expenditure proposed by this scheme; but urges the Planting Member to ascertain the views of Government on the subject, as it fully recognises that the labour problem must be faced, and some remedy found for our difficulties."

1806. *Post Office at Perrendotty.*—Read correspondence; the Post Master-General states that under the rules of the Department he is unable to refund the money paid as a guarantee even if the Post Office pays its way. Resolved: "That this Meeting instructs the Honorary Secretary to write to the Postmaster-General expressing its regret at his decision, and inquiring what the new rule is: as in the case of post offices opened in other planting

districts, e.g., at Ranee and Mundakayam, only a conditional guarantee against loss was demanded."

1807. *Remission of Assessment*.—The following extract from G. O. 2644 Revenue dated September 3rd., 1912, was read and is printed for information :—

"In the Wynaad Taluk of the Malabar District, plantations of pepper, coffee, tea, cinchona, rubber or other special products newly made on land taken up under these rules or on land already under occupation will be exempt from assessment for three complete years. The question as to what products shall be deemed to be 'special' for the purpose of this rule is a matter entirely within the discretion of Government."

1808. *Roads*.—Read letter from Assistant Engineer about Vellera Mulla Bridge. The Honorary Secretary was instructed to ask that the work of reconstruction be pushed on as rapidly as possible.

1809. *Warrants*.—Read correspondence between Mr. Powell and the Vayitri Magistrate regarding the refusal to grant a Maistry a hand warrant, and the great delay that takes place in issuing warrants, copies of which have been sent to the Divisional Magistrate.

A vote of thanks to the Chair terminated the Proceedings,

(Signed) J. CARSON PARKER, *Chairman*.

(„) C. E. ABBOTT, *Hon. Secretary*.

Coorg Planters' Association.

A Meeting of the Coorg Planters' Association was held at Mercara on 14th November to welcome Mr. L. G. Jonas, the recently appointed Scientific Assistant for Coorg. The Scientific Officer, Mr. R. D. Anstead, who came up with Mr. Jonas formally introduced the latter, and his address was printed in the *Chronicle*.

Mr. Jonas exhibited a number of samples of Coffee which he had obtained from the brokers in England and brought out with him. These showed the different grades which find favour on the market. In explaining these samples Mr. Jonas said :—

"I was able to get a few samples of Coffees from different parts of the world. The Scientific Department has reserved some of each sample for record and analysis. The rest is here for your inspection. I hope that these will form the nucleus of a larger collection than this, as I am in communication with Messrs. Travers & Co., of Cannon St., London, who are Coffee merchants of considerable esteem, and their buyer has promised to frequently send me samples of any coffees, other than Coorgs, that may be fetching any particular prices in the English market, and which have any other peculiarity in value, so that we may compare them with our own Coorg varieties.

"I am also trying to get samples and methods of tasting, etc., from some Continental firms.

"I find that it is often asserted by many coffee planters that there is considerable prejudice shown in the markets for certain brands and estate marks, so that I endeavoured to find out, while in London, the data on which merchants base their judgments when buying for the English markets.

"The brokers do not taste at all. They judge partly by sight, and partly by the demand of the wholesale merchants for particular brands.

"The merchants do a certain amount of tasting but they are not over-keen to give away the methods, which they adopt; however, I will endeavour to give you a short resume of the method practised by a London wholesale merchant.

" I may class their tests under two headings :—

i. Judgment by sight and weight.

ii. Judgment by tasting.

" i. *Judgment by sight and weight.*—A large, bold berry is preferred, of a bluish green colour.

" Then handfuls of the different samples are taken, and the buyers can tell to a nicety from their long experience, the comparative weights of the bulk which these samples represent.

" The weights of all the samples which I have here, are the same, so that you can gain an idea of their comparative bulk.

" While on this subject I should like to refer to that word 'bold' that I have just used.

" Now I think that 'Maragojipe' may be taken as a fair idea of what I mean by bold.

" I have been told by several buyers that there is really nothing very specially attractive in 'Maragojipe' as regards taste, but that consumers insist on having a large berry, the idea in their minds being that 'in order to be good, it *must* be large.'

" ii. *Method of Tasting.*—Equal weights of each sample are roasted for half an hour. A sampling cup which should contain about 100cc. of water when full is placed on one pan of a balance and is counter-poised by an equal weight in the other pan. The roasted sample is then ground straight into the cup, the weight taken, being equal to that of a new English penny. I may state an actual weight as being 10 grams. The rest of the samples are treated in exactly the same way until there are, say, 10 cups in a row, each with its 10 grams of coffee and a spoon.

" Then water, which has been boiling for about 1 minute is poured into each cup, until it is about three quarters full. The contents of the cups are then well stirred with their respective spoons, to ensure the proper infusion of the coffee, filled up to a mark on each cup, and left to stand for about three minutes. During these 3 minutes a scum forms on the top of the liquor which is skimmed off.

" At the end of the three minutes the grounds will have quite settled, and also the coffee will have become cool enough to taste.

" The actual tasting is done by using a flattened dessert spoon, taking a spoonful from near the top of each cup, so as to avoid disturbing the grounds.

" The tasting spoon being well washed after each taste. The undesirable coffees are at once eliminated, then those that are 'fair,' and lastly the one that the taster considers best. The infusion must have an acid flavour, and it must also be a 'round' one—but this is almost impossible to describe in words.

" I am given to understand that the Coffee planters in South India are particularly interested in the so-called deterioration of the quality of their coffee, and that it has been suggested that work might be undertaken to investigate the matter, and I hope, therefore, that some of us will be able to meet together to discuss the question of the quality and curing of coffee, and study tasting methods with the object of working out some system by which we can test coffee in this country before shipment on parallel lines to those usually adopted by buyers in the European market."

After a few words of welcome from the President, Mr. Murray-Aynsley, the Meeting was formally closed, and a most interesting discussion took place on the samples exhibited and the subjects raised by the officers of the Scientific Department.

RUBBER.

Rubber Conference at New York.

The third International Rubber Exposition was opened at the Grand Central Palace by an address delivered by the Dock Commissioner, Calvin Tomkins, who welcomed the delegates of foreign governments on behalf of Mayor Gaynor. He called attention to the fact that ever since the rubber industry began to develop with the discovery of vulcanization, America had become the principal user and manufacturer of that commodity. At the present time, said the Commissioner, the United States uses more than half the total production of the world's raw rubber.

Delegates to the rubber Conference will begin their sessions to-day when scientific papers will be read. Henry C. Pearson, of New York, is to preside, and lectures are to be delivered by Arthur W. Stedman, New York; Cyril E. S. Baxendale, Ceylon; Dr. Santiago Cardwell-Quinn, Brazil; Charles P. Foz, Akron, Ohio; Francis E. Lloyd, Montreal; P. L. Wormley, Bureau of Standards, Washington; D. C. Jurgensen, President of the Institute of Operating Chemists; L. E. Weber, Boston, and others.

Commissioner Tomkin's address was, in part, as follows:—

"I congratulate you on the comprehensive educational value of your exhibition. It is of more than mere technical and trade interest that knowledge concerning this great staple industry should be popularly disseminated. Most of the great staples are in part used where they are made and people consequently know about them. The authoritative statement was made at the International Chemical Congress, just adjourned, that before long this might be true of rubber also. Whether, as was the case with the ancient madder and indigo culture, the processes of nature will be superseded by laboratory and factory processes or to what extent nature shall be assisted are interesting and not barren speculations.

"All the world is expectantly awaiting the great chemical and physical advances in knowledge which scientists of the highest accredited reputation assure us are impending. This expectant attitude is especially characteristic of the rubber industry at this time. Possibly rubber may be made. Probably the culture of rubber plants will be extended in plantations and protected in the wilderness. Certainly improvements in culture and improvements in processes will advance the art, and great international fairs, such as this, by bringing together the men and products of the industry will, through the free interchange of contemporary thought, admirably serve the interests of our rapidly advancing civilization.

"In this great and representative exhibition two things especially will strike most people—first the fine machinery (mainly American) which is employed either in treating the rubber in its earliest and crudest stages, or in utilizing it in its finished forms for all sorts of purposes from hose to overshoes, from tyres for automobiles to toys for the nursery, from deep sea cables to flooring, such as that over which we walked as we entered this exhibition; the second striking thing is the rivalry—a perfectly friendly but nevertheless a very serious rivalry—which exists for premier position in the markets between what is called wild rubber and plantation or cultivated rubber.

"Brazil is the home of rubber. Without the fine trees of the Amazon forest, which for centuries have been yielding the precious milk from which rubber is made, the mighty industry which the exhibition illustrates would have been impossible.

"It was hardly to be supposed that so valuable a national asset would be allowed to develop without rivalry. Thirty-five or thirty-six years ago some thousands of seeds were taken from Brazil and planted in India, Ceylon and in the Malay Estates. The result of the successful germination of those seeds have been so remarkable that the output of plantation rubber will probably be at least as great as that from Brazil.

"As the world's consumption of raw rubber bids fair soon to exceed 100,000 tons per annum (apart, that is, from the enormous quantities of reclaimed rubber which are used every year), we have here a very interesting situation, which is being watched with eager attention not only in Brazil and in the East, but by the manufacturing markets of two continents." —*New York Journal of Commerce*.

History of the Commercial Development of India Rubber.

BY S. FRANKENBURG.

The first notice of India Rubber or caoutchouc we can trace is to be found in a work written by Antonio de Herraray Tordesillas (published at Madrid from 1601 to 1615), describing the voyages of the Castilians from 1492 to 1554. In this mention is made of the natives of Hayti playing a game with balls made from the gum of a tree, doubtless India Rubber.

Again, in dealing with the conquest of Mexico, the Castilians found trees in which the natives made incisions from which there flowed a milky substance that converted itself into "a white gum with a pleasant smell." Juan de Torquemada, in his book "The Indian Monarchy," published in Madrid in 1615, was the first to give an accurate description of the leading characteristics of the trees ("Ulequahuatl," or *Castilloa elastica*) which yielded this gum, and of the method employed by the Indian natives to collect it. Torquemada states that the Indians used the rubber for medicinal purposes, and that the Spaniards in Mexico were the first users of waterproof cloaks.

In 1736 Lacondamine sent to the Paris Academy of Science from Brazil a dark, resinous lump of caoutchouc, from which the natives made torches. He later found the Hevea tree growing along the banks of the Amazon. The Indians of this district gave the name of "Cahucha" to the resin, the waterproofing properties of which were well known to them.

In 1762, Fusset Aublet, a French botanist, discovered the rubber tree in French Guiana, and named it *Hevea Guyanensis*: whilst about the year 1765 another Frenchman, M. Coffigny, found rubber trees in the Island of Madagascar.

During this time the new resin was the object of study by a number of chemists with a view to making use of it for manufacturing purposes. Their great difficulty was to find a good solvent.

In 1761 Herissant and Macquer found a satisfactory solvent for caoutchouc. By dissolving it in oil of turpentine rectified over lime they obtained a pasty mass which allowed the rubber to regain its former elastic state. They pointed out also that ether might also be used as a solvent.

In 1770 Dr. Priestley found that rubber could be used for erasing pencil marks, and Magellan introduced this use of rubber into France in 1772. The price at that time was about 20s. an oz.

In 1798 rubber had been found in Penang, by Mr. J. Howison, who discovered the tree known as *Ureceola elastica*, and shortly afterwards in Assam by Dr. Roxburgh. The tree he found there was the *ficus elastica*.

In 1791, Samuel Peal took out the first patent in connection with rubber, "For application of dissolved India rubber to waterproofing, the solution in spirits of turpentine to be spread over the fabric with a brush." Peal does not seem to have done anything with this patent, and it was 29 years before the next patent was taken out, this being granted to Thomas Hancock on April 29th, 1820, and was "For an improvement in the application of a certain material to various articles of dress and other articles that the same may be rendered more elastic."

In 1823 Charles Macintosh brought out a patent for waterproofing fabrics by a solution of India rubber in coal, oil or naphtha, and established a factory for the manufacture of waterproof articles at Glasgow. This factory he later on moved to Manchester. He formed a partnership with the Messrs. Birley, the firm being called Charles Macintosh & Co. This is still one of the largest factories in this country, and although there is now no Macintosh in the firm, the third and may be the fourth generation of the Birley's are still actively connected with it. It was in Manchester then that Charles Macintosh began to make those waterproof coats which still bear his name.

Up to this time the rubber had been coming into the country in the form of bottles and of figures, and a difficulty was found to get the material of uniform thickness. Hancock in London had in 1826 made for him a machine worked by man power to masticate the rubber. This machine would take a charge of one pound. Next year he moved to a larger place in Goswell Road, where he had a horse mill put up and fixed here larger masticators, and also iron rollers through which he passed the raw rubber when hot, which process he found formed into a rough corrugated sheet, thus bringing it into a good state of preparation for the masticator and also greatly facilitated drying. The charges he was now putting into his machine were of 14 to 15 lb. in weight. The same machines are still used to this day with very few alterations, with the exception that they are much larger.

Hancock was now manufacturing all kinds of elastic articles such as garters, braces, knee-caps, surgical bands, etc. In 1823 he commenced making billiard table cushions, and in 1826 he was making rubber driving belts for machinery and card fillets for carding machines. He had in 1825 taken out a license from Macintosh for the use of his patent. This he now began to apply to air-beds, air-cushions, etc. He also made life preservers of rubber. About this time his brother, John Hancock, started making rubber hose which was taken up in the first place by breweries. Thomas Hancock next took in hand the manufacture of diving suits and tubes for supplying air to the diver. In 1828 he started a factory in Paris principally for the manufacture of elastic webbings.

In 1830, Hancock joined Charles Macintosh and Co., still, however, keeping up his place in London. During the next few years other people started experimenting with the manufacture of rubber articles.

The one disadvantage of the waterproof articles manufactured by Hancock and Macintosh was, that they would not stand the extremes of heat and cold. In 1832 a German chemist, Ludersdorf, discovered that sulphur mixed with rubber dissolved in turpentine took away the viscosity but he does not seem to have gone further in the matter.

It was an American, Nelson Goodyear, who first solved the great secret of how to produce rubber articles which would keep their nature in the extremes of heat and cold. Goodyear's partner, Nathaniel Hayward, accidentally dropped on a heated stove some rubber mixed sulphur, and afterwards noticed how the sulphur was taken up by the rubber, which itself became elastic and kept its nature when afterwards exposed to the sun's rays. This was in 1839. Goodyear saw the possibilities of this discovery and further developed it. He had already been experimenting with rubber dissolved in alcohol, and in 1836 had secured a contract from the U. S. Government for waterproof mail bags, which, however, had been found useless at high temperatures. Goodyear finally took out an American patent in 1844 for his vulcanising process.

In the meantime, however, Hancock had in 1843 taken out a British patent for practically the same process, so that when in 1847 the Hayward Rubber Company of America started importing rubber overshoes into the country, they were challenged by Charles Macintosh, who stated they were infringing Hancock's patent. The matter was, however, arranged amicably by Macintosh granting the American firm an exclusive right to sell in this country overshoes of their own manufacture.

1846 Alexander Parkes took out a patent for the cold cure of vulcanisation process, which consists in immersing rubber in a solution of sulphur, chloride, and carbon bisulphide. This process showed that heat was not necessary for the vulcanisation of rubber.

Rubber at this time was replacing leather for many purposes. In addition to the uses already mentioned it was now being used for steam valves, for door springs, for railway buffers and also for rollers for printing. It now came into use for carriage tyres, and in 1850 Lt. Halkett, of the Royal Navy, brought out his rubber collapsible boat, which is still used by many a yachtsman. The use of rubber for manufacturing purposes was now becoming very wide-spread, and during the next 30 years new factories were springing up.

In 1886 a patent was granted for printing patterns on the rubber face of faced cloth, and about the same time a process was brought out to get rid of the smell from waterproof cloth, which had prevented the Macintosh from being very largely used. These two processes brought the waterproof garment into much wider use, more especially for ladies, who up to this time had not been specially catered for.

About this time also the bicycle was becoming popular, and the manufacture of bicycle tyres gave a further impetus to the rubber trade. This was further strengthened by the introduction of the pneumatic tyre by Michelin and Dunlop.

The great development in electricity for lighting and power purposes also created great demands for rubber for insulating purposes.

Next came the great development in the use of motor cars, which made a further demand on the rubber industry; in fact with the lowering in price of motor cars, which brought them into popular use all over the world, and the resultant demands for tyres, the demands for raw rubber had become great, and was increasing so rapidly, that in the beginning of 1910, there was a temporary shortage of supply, which with the help of speculation sent up the price of Pará rubber in less than 18 months from 2s. 9d. to 12s. 6d. per lb.

The following figures will serve to show the great increase in the demand for rubber. In 1830 the total export of rubber from America was 25 tons. In 1850 this had grown to 750 tons. In 1870, 1,500 tons. For the season 1900—1901 the receipts of rubber of Pará alone was 27,600 tons, whilst in 1910—1911 the receipts of Pará was 37,500 tons. Besides this increasing quantities were being exported from Africa and from the Eastern plantations.

Plantation Rubber.—It was in June 1876, that the first supply of *Hevea* seeds was introduced into England, Mr. Wickham having collected them in the Amazon Valley on behalf of the Indian Government. A few weeks later, 7,000 seedling *Hevea* plants, grown from these seeds at Kew, were sent to the Eastern tropic Botanic Gardens mostly to Ceylon. To show what bearing the plantations will have on the rubber market in the near future, the amounts of rubber exported from there during the last few years have been as follows:—1908, 2,500 tons; 1909, 4,600 tons; 1910, 7,050 tons; 1911, 12,000 tons.—*Journal of the Chemical Industry.*

Ceara Rubber in Uganda and Nyasaland.

Thanks to Mr. Samuel Simpson, who, after taking up the reins as Director of Agriculture at Entebbe, Uganda, kindly sent us their last Agricultural report, we are able to give the following particulars of Ceara planting in that Protectorate. The total area planted with this variety is given as 17 acres, of which 13 acres were planted last year (1911). The oldest trees were planted 13 x 13 in November, 1909, from seedlings four months old. The situation was rather wet, but after being drained the trees did very well, and a small number have been recently tapped. Those planted in October, 1910, at 10 x 10, have grown very well, though there is a great deal of difference in the size of individual trees. The average girth of these latter trees at 3 feet from the ground is 1'86 inches, whilst the largest is 16 inches, and the smallest 6 inches.

The trees planted during last year were placed at various distances apart, with the object of determining the most suitable distance. One acre and a half was planted 12 x 12, a second one 14 x 14, whilst five acres went 16 x 16. All the above were planted on the square system, and a second plot of five acres, 16 x 16, was planted on the hexagonal system, which gives a more equal distribution of the trees and a greater number per acre than the square method. The growth of the trees all round has been very good, and the breakages by wind very few, and in those cases where the tops have been broken off a new top was speedily formed. Tapping was commenced on twenty trees on November 15, (1911), and continued to the end of December. The yield was small, but the trees were young, and the season not very favourable. These trees were again tapped in March, and gave better results; and twenty smaller trees were also tapped, these giving similar results to those obtained with the trees tapped in November and December. The method of tapping in each case was the "half herring-bone" to half the circumference of the trees, paring and pricking immediately afterwards. In the first instance the height tapped was 4 feet, but in the two latter cases 5 feet, the lateral cuts being 1 foot apart at an angle of 45°. No chemicals were used in the first instance, but in the two latter instances a dilute solution of Ammonia was placed in the collecting cups to prevent coagulation, and gave good results. The trade preparation known as "Purub" was used for coagulating. This also proved satisfactory, but it would be well to delay any definite opinion until the rubber has been analysed. The trees which have been tapped

show no sign of injury through tapping, and are growing quite as vigorously as those which have not been tapped. The following are the results obtained in tabulated form. The trees (20 in each case) were tapped on alternate days, say :—

Dry rubber obtained.						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
16'45 inch.	Nov.—Dec.	20	7'625	2'375	10'00	2'50 oz.
17'32 „	March	14	9'50	2'00	11'50	4'10 „
15'60 „	„	12	5'00	1'00	6'00	2'50 „

(1) Average girth at 3 feet from ground; (2) period of tapping; (3) number of times tapped; (4) total biscuit; (5) total scrap; (6) biscuit and scrap; (7) average per 100 tapplings.

As the trees were planted in November, 1909, when they were four months old, they were nearly two and a half years old in November, 1911.

A small number of *M. dichotoma*, *M. piauihyensis*, and *M. heptaphylla* were planted out in March, 1910, but the two latter species were attacked by white ants, and nearly all of them died. The *M. dichotoma* has grown very well, but it is too early to say whether it is likely to prove better than the ordinary type.

Coming to another African Protectorate, that of Nyasaland, we learn that the cultivation of Ceará rubber is receiving more attention than formerly. Thus reports Mr. Stewart McCall in his report issued as Director of Agriculture. Whilst this rubber has been grown in most parts of the Protectorate, it makes satisfactory growth only in rich soil with good rainfall, and is quite unsuitable for light, sandy soils, found in districts with a rainfall under 40 inches unless planted along streams or on alluvial flats near the river where the roots can reach water. A humid atmosphere evidently is found favourable in Nyasaland for Ceará, both from point of growth and the future life of the trees under "tap." Hot, dry weather, it is found, prevents the proper healing of the delicate cortical tissue exposed by the tapping knife. It has been noticed that those trees always recover best which have been tapped during the wet season, or in the early part of the dry months. On this account it is dangerous to continue tapping far into the dry season.

West Nyasa and south-east M'lange are said to be the most suitable districts for Ceará, although, the report adds, good rubber can also be grown in selected places throughout the Shire Highlands and on the Upper River; but planters are warned against laying down this rubber on an extensive scale until further particulars are forthcoming regarding yields, the life of the tree, &c.

As leading that way, it is worth carefully noting that in the experimental gardens at Zomba some 200 trees, which have now been tapped for three years, have made a perfect recovery. As Zomba is by no means a rubber district it is anticipated that, with care as to time of tapping and the methods employed, Ceará will prove a commercial success in West Nyasa and the M'lange District.

A word of warning, however, is put forth against a tendency to plant in all parts of the Protectorate with a view of increasing the value of estates. When this is done, we are told, the expense is not justified, for the trees are

only suitable for cutting down, as their growth does not warrant the expenditure of keeping them sufficiently clean to prevent bush fires from entering the plantations. Again, a considerable area that would have been very suitable for cotton and tobacco, if green manure has been put under rubber, for which, on account of the situation, soil and climatic conditions, it was utterly unsuited, and so no good was obtained from the money invested. Under such conditions the trees have the appearance of struggling for sheer existence, and show no chance of ever producing rubber on a profitable basis. When these mistakes are made, the best thing to do is to recognise that it is a mistake and to remove the Ceará trees, plough up the land, and sow with green manures for a season, and then plant rotation crops of tobacco and cotton.

Most crops should be planted at increasingly wide spaces as the soil grows richer, so as to allow the trees room to expand, as they will do when well fed; but with Ceará, at any rate in Nyasaland, the tendency is to plant the rubber closer than hitherto, so that now considerable areas are planted 9 x 9 (to the acre), when the soil is rich enough to bear so large a number to the acre, but to expand to 12 x 12. and even 15 x 15 (302 and 193 tress to the acre) for poorer soils. The closer planting is considered to probably be a good practice when possible, as the continuous overhead shade protects the soil and the delicate cortical tissue from the direct rays of the sun, and tends to help make it possible to continue tapping further into the dry season.

Ceará rubber, Mr. McCall tells us, can be tapped very early in Nyasaland without bad effects, and, although it is generally considered that the rubber from young trees is inferior on account of the high percentage of resin, latices from two-to three-year-old trees in the M'lange District are producing rubber which is selling at only a few pence below the best Pará. When preparing such rubber the great secret is the use of plenty of water, and adequately and thoroughly washing the rubber before rolling it out into biscuits.

During the tapping season in the M'lange District each tapper with his assisting boys brought in $\frac{1}{4}$ lb. dry rubber daily from $2\frac{1}{2}$ -years-old Ceará, at a cost in labour of 3d., equal to 1s. per lb. for cost of collection. This was from a small area of 540 trees, planted 9 x 9, of which only 270 trees were considered large enough for tapping. As each man and boy had 90 trees for their task, it took three pairs to tap the 270 trees, which were tapped on each alternate day in groups of 45. As regards yields, Mr. McCall reports that he saw the returns weighed for some weeks, and found that they averaged a little over $\frac{1}{4}$ lb. dry rubber daily from 45 trees. Such a return, it is reckoned, would work out at about 5 to 6 oz. dry rubber a year in six months' tapping, after which the trees are left until the next tapping season. At the conclusion of his remarks on Ceará rubber, Mr. McCall states that he believes this rubber will prove a paying crop when planted in the right district, but that he does not consider it suitable for general cultivation throughout the Protectorate. The following measurements are worth noting:—

Measurement of Ceará trees, $3\frac{1}{2}$ years old, in West Nyasa District, planted 15 x 15.

Average girth of 101 trees at 3 feet from ground ...	19'43	inch.
Girth of best tree	30	„
Girth of worst tree	13	„

Measurement of Ceará trees, 1½ years old, in West Nyasa District, planted 10 x 10.

Average girth of 105 trees at 3 feet from ground... 10'66 inch.

Girth of best tree 17 „

Girth of worst tree 8 „

The total area planted by Europeans with Ceará is given as 7,542 acres in 1911, against 4,403 acres in 1910. The estimated crop from the Blantyre District, 3,646 acres planted, was 4,470 lbs. for 1911, whilst Zomba, with 1,345 acres, was expected to yield 500 lbs. last year.

In the general remarks added by Mr. E. N. Davy, the Government Agriculturist, we learn that the rubber planted in 1909 has generally made fair growth, the plants propagated from cuttings maintaining a superiority over seedlings, whether the latter were raised at stake or transplanted. The plants required frequent pruning in order to produce clean stems six or more feet high. An experiment in germinating Ceará seeds has yielded a curious result. Six hundred seeds were divided into six sections and sown in January, 1910, one batch of seeds being untreated, whilst the remainder had been soaked in water for periods varying from one to five weeks previous to soaking. Twenty per cent. of the dry seeds germinated within three weeks, but the remainder, together with all soaked seeds, remained dormant until December, 1910, when the seeds in the various sections germinated simultaneously to the extent of 95 per cent.; thus showing that soaking the seeds in water does not always expedite germination.

Of the other Manihots, *M. dichotoma* produced a fair crop of seeds, which were planted out but the germination was far from satisfactory. The growth made has been fair, but the trees are not yet large enough for tapping. *M. piauhyensis* (known locally as Remanso) ripened a few seeds only. The plants have made comparatively little growth, and would appear to reach their maximum height in three years.—*Tropical Life*.

The Manuring of Rubber Trees.

The following is an abstract, in the *Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases*, July 1912, of a paper by E. de Wildeman in *Le Caoutchouc et la Gutta-Percha* for March 15, 1912, p. 6037:—

It has been demonstrated that the use of a certain amount of manure is necessary for the successful growing of rubber trees. Some chemical compounds not only exert a favourable action on the development of the trees, but also on the yield of latex. Thus it appears from various experiments, which, however, are not completely conclusive, that nitrate of soda increases the flow of latex and the proportion of rubber.

At Hawaii some manihots were manured with nitrate of soda buried to a depth of 4 inch s. The experiment was conducted with three lots of manihots. The first was kept as control, the second was manured with ¼ lb. of the salt per tree and the third ½ lb. per tree. The control trees yielded during the experiment 1 to 2 oz. of dry rubber each; those of the second lot 1 to 3 oz., and those of the third lot 2 to 3 oz. per tree. The effects of the nitrate begin to show after forty-eight hours. (See *Agricultural News*, Vol. X, p. 265). M. E. Lierke has demonstrated that potash plays a most important part in furthering the development of Heveas, but it must also be borne in mind that manures, and especially potash, seem to favour the development of plant parasites also.

Among the rubber growers in the East, lime as a manure raises at present the greatest interest. The value of lime must be considered according to the soil in which the trees are grown. In the Middle East the soil is peaty, clayey or sandy. In peat soils deep drainage is advisable, after which the soil must be allowed to dry and then it is limed in order to neutralise its acidity. Clay soils improve physically after the addition of lime; they are easier to till and do not crack after prolonged drought. In sandy soils lime improves the cohesion. Lime acts also directly as plant food; it prevents the development of the weeds which infest acid soils, and its application may also become necessary after the repeated use of other manures, such as sulphate of ammonia, kainit, and superphosphates which, in the long run, produce a certain amount of acidity in the soil.

Lime further stops the development of fungi which produce root rot, and especially of *Fomes semitostus*, which causes serious injury to Heveas.

It is recommended to slake quicklime with water, allowing it to turn to a dry powder, and then to spread it broadcast at the rate of about 5 cwt. per acre, and at least four times as much on peat or clay.

Experiments conducted in tropical regions where the rainfall is abundant show that it is preferable to apply lime and the other manures during the relatively dry season.

In the Malay States the following formula is recommended:—

				Quantity per acre.
Slaked lime	...	..	...	$\frac{1}{2}$ to 1 ton
Basic slag	...	...	...	350 lbs.
Sulphate of ammonia...	...	...	...	150 "
Sulphate of Potash	...	...	...	100 "
or kainit	...	...	...	400 "
or chloride of potash	...	...	...	100 "

Instead of salts of ammonia, castor oil, linseed, cotton seed, earth nut, (ground nut) or Hevea seed cake may be given, and guano may be used instead of basic slag.

Most crops grown between the Hevea trees appear to retard their development and diminish the yield of rubber. Tapioca (cassava), sugarcane, and pine-apples exhaust the soil considerably; coffee and cacao are not so harmful, especially if the plants are kept at a sufficient distance.

There is a good deal to be said both in favour of and against the use of artificials or of green manures, and the planter must judge according to his special conditions and decide which type of manuring may be most useful, or whether he may not preserve and improve the fertility of the soil by 'clean weeding,' and sterilize its surface by the heat of the sun. This last method naturally requires a great amount of careful labour which cannot always be given.—*The Agricultural News*.

Messrs. Marshall, Sons & Co., Ltd., Madras, inform us that they have received a cablegram from their Works in England advising an advance on the current prices of all Jackson's Patent Tea Machinery, which they manufacture.

The increase is due to the excessive rise in all raw materials and the enhanced rates for skilled labour now ruling at home.

Revised catalogues and Price Lists are being published and will be circulated as soon as possible.

The Planters' Chronicle.

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CORRESPONDENCE.

The Secretary,

U. P. A. S. I.

Kalisyndikat, G. M. B. H.,

Berlin, October 21st, 1912.

Dear Sir.—We beg respectfully to inform you that Mr. Paul Friedrichsen, the former Manager of our Propaganda Offices in the Bombay and Madras Presidencies has been appointed to our Head Office here and that Mr. R. Birnie, M.A., B. Sc., from Scotland, has been selected to succeed Mr. Friedrichsen in India.

We take the opportunity of thanking you for the courtesy shown to Mr. Friedrichsen and for the confidence placed in him during his stay in India and we trust you will extend the same towards his successor, who is expected to sail for India about the latter half of November.

As formerly, our Agricultural Office will be located in Bangalore.

We are, dear Sir,

Yours respectfully,

Kalisyndikat, G. M. B. H.,

Agriculture-Abteilung.

A Warning.

One Abraham, East Indian, with capital character and letter to show he had recruited for Malaya, wrote asking for work and then came to Estate said he had been recommended to try self by a Police Superintendent.

Got Rs.50 to run round and see what he could do. Later wired for funds from Mysore. Got a half of what he wanted on executing Bond before a Sub-Judge. He then began to show his activity by wiring and writing from Kolar, Villapuram, Hindapur, &c., always the one theme coolies ready—cash needed; and this was all managed by him while sitting with his family at Kolar. Telegrams and letters were forwarded through relation or Station Masters.

I sent an absolutely trustworthy man with Rs.300 more after arranging a meeting with Mr. Abraham in Bangalore, to pay rail, &c., on seeing the coolies; he was on different excuses taken to Kolar and Hindapur where 3 East Indians and others eased my man of his money by threats of violence, and his watch (which as it did not go) was returned. My man was then taken to Hindapur as it was necessary to send me a telegram, which was to the effect "32 coolies have gone on to yours am going Salem." At the same time a telegram was sent to Station Master, Salem, "send all wires and letters to Kolar," and now I am awaiting Police developments. Not an anna has ever been advanced that I can learn.—H. W. R.

DISTRICT PLANTERS' ASSOCIATIONS.**South Travancore Planters' Association.**

*Proceedings of the Third Quarterly Meeting held in the Club,
Quilon, on Saturday, November 9th, 1912.*

PRESENT.—Mr. J. Stewart (in the Chair), Messrs. J. S. Valentine, J. H. Parkinson, L. G. Knight, Mitchell and A. W. Leslie, (Honorary Secretary.) Visitor:—Mr. A. F. Macdonald.

1. The Minutes of last meeting were read and confirmed.

2. *Sri Mulam Assembly*.—It was proposed by Mr. Valentine and seconded by the Chairman that Mr. J. B. Cook be asked to represent this Association as their delegate at the forthcoming assembly.—Carried.

3. *Cooly Rates*.—After some discussion it was resolved that a general understanding by the members present for a combination to adhere to the present rates.

4. *Waste Lands*.—Resolved: "That the Honorary Secretary write Government that "Persons or Companies who hold properties or land within the Reserve should be allowed to extend their property by taking up land adjoining, by purchase, at the upset price, and to the extent of say 30%."

5. *European Ward*.—Resolved "That the Honorary Secretary be asked to remind Government of the urgent necessity for the completion of the European ward proposed to be added to the Quilon Hospital."

6. *Post Office and Mails*.—Mr. H. W. Heberden's letter dated 17th October read as follows:—

Shaliacary Estate.

Punalur P. O., 17/10/1912.

The Honorary Secretary,

South Travancore Planters' Association.

Dear Sir,—I enclose letter from Punalur Post Master which explains why Ceylon letters and papers are always a day late.

Will you kindly write the Post Master-General and try and get mails brought up by the 11 a.m. train from Maniachy as was previously done? This train also could well take letters to Quilon from intermediate stations which is not now being done. Our mail service here is a disgrace at present, and I think you will agree with me that it is quite time we unanimously complained.

Yours faithfully,

(Signed) W. H. HEBERDEN.

And the following explanation dated 16th October from the Sub-Post Master, Punalur, to Mr. Heberden was read:—

POST OFFICE.

From the Sub-Post Master, Punalur.

To H. W. Heberden, Esq., Shaliacary,

Punalur, 16/10/1912.

Sir,—Your letter of date, the morning train from Shencottah does not bring any mails from Shencottah to Punalur. The evening train which reaches Punalur at 3 p.m. brings mails from Shencottah, Kalthuritty and all

places beyond Shencottah. The Ceylon newspapers, etc., which formerly arrived by 6 p.m. Mail now come by the 3 p.m. has been discontinued some months back. The Ceylon newspaper coming in your bag to-day has been posted at Colombo on the 14th. It reached Tuticorin on the morning of 15th. It could not catch the Mail which reached here at 3 p.m. on 15th for by the time it reaches Maniyachi, the train for Punalur has already left, so that the newspaper remained at Maniyachi and catches the train only to-day which arrives Punalur at 3 p.m. It is delivered to you to-morrow 17/10/12. Formerly this newspaper arriving at Tuticorin the next morning would come here directly the same evening and be delivered to you one day earlier.

(Signed)

Sub-Post Master.

It was then resolved: "That the Honorary Secretary forward a copy of the above correspondence to the Post Master-General and at the same time point out the great inconvenience caused by this unnecessary delay in the transit of Colombo mails."

Government Gazette.—Resolved: "That the Honorary Secretary send subscriptions for the Travancore Government Gazette to be taken in annually."

This being all the business, the Meeting closed with a vote of thanks to the Chair.

(Signed) A. W. LESLIE,
Hon. Secretary.

TEA FOR THE WOUNDED.

INDIAN ASSOCIATION'S GIFT TO FIELD HOSPITALS.

Times of Ceylon Office, 27, Mincing Lane, London,
November 7th, 9-35 a.m.

The Indian Tea Association is sending a gift of 1,000 pounds weight of tea to the Red Cross and Crescent Societies working in the Turkish and Balkan field hospitals.—*The Weekly Times of Ceylon.*

KOTMALE PLANTERS' ASSOCIATION.

Coast Recruiting.—The Chairman brought to the notice of members that instances of kidnapping of minors for recruitment as coolies had been brought before the authorities in India and in a certain case had resulted in a sentence of six months' hard labour, and that the Magistrate had caused a circular to be issued throughout the coolie districts.—*The Weekly Times of Ceylon.*

Tea.—In sympathy with the keen demand for China tea this past season the export of scented capers to London shows an increase on that of the previous year, although shipments of Kooloo to the colonies are smaller. The cost of the leaf and scenting flower was higher than in the previous year.—*Diplomatic and Consular Reports. China. Report for the year 1911 on the Trade of Canton,*

NILGIRI NOTES.

In a District like this where the conditions are so varied it is difficult to give an exact idea of the conditions of weather and crops as a whole, and so these notes must be taken merely as an average indication.

Weather.—The S. W. Monsoon started early but was weak during the latter part of June and July, and in August there was a complete break of about three weeks of fine weather; this break, with occasional showers lasted in some parts up to the 10th September. From this date to the end of October there was good North East rain, and after another short fine spell rain has now set in again. Taken all round it has been a grand planting season. Tea has been flushing well, and the distribution of rain should prove beneficial to the quality of coffee.

Tea is booming, and Nilgiri Estates have been realizing remarkably good prices. This encouragement has caused renewed activity in extending the Tea area of the district, and it seems likely that Tea will oust Coffee from its position as the premier product of the district in the near future, as it has already done in the Wynaad.

Coffee.—This of-late-years-much-despised product is in a very strong position as far as prices are concerned, but the pity of it is that many Estates have been severely weakened by Green Bug and the many evils that have followed in its wake, and there are but few that are bearing crops. In parts, though the yields expected are still very good, in spite of reduced estimates, especially round Coonoor and Kartairy, and with Coffee now selling at Rs.57 to Rs.58 ex curing per cwt., these estates will show remarkably useful profits. The great feature of this season has been the diminished activity of Green Bug early in the year, and is being kept in check by the early June rains, so that now the amount of bug alive is practically nil everywhere. All estates that have been kept in fair order are looking healthier than they have for years.

Of *Rubber* one hears but little as most of the district is too high in elevation for it to do well. Some estates are in tapping, but the yield is not generally good.

Labour.—What would happen in this district if it were not for the fairly abundant supply of "locals" is difficult to imagine, and even as it is the pinch is beginning to be felt on a number of Estates. Still many planters seem to be fighting shy of facing the Labour problem by *doing* something instead of eternally *talking*. Apparently the Labour Committee are marking time as most of the District Associations are so reluctant to give definite opinions as regards the latest Registration Scheme.

The Experimental Plot which has been started seems to have resulted in some want of cohesion between the local Planters and the Scientific Officer. This is a poor state of affairs for a start, and what will happen later on goodness only knows, and most planters round here appear to care less! Under the circumstances it seems to be a pity it was ever started. However it is to be hoped that it will justify its existence at some future date. When expert opinions differ it is hard to come to a conclusion. One expert avers that the land is too steep to ever be able to do good work. His neighbour declares it to be the most suitable spot in the district. One expert maintains it was started for one special object, others disagree as to the primary object of the plot. In the meantime no definite scheme of work has been formulated, or at least nothing that anyone knows anything about. It is about time for the U. P. A. S. I. executive to step in and arrange what is to be done and under whose control,

17th November, 1912.

TEA.**Market Position and Prospects.**

Since the last notes were made, for publication much that is of moment to the tea trade and deserving of notice and comment, has happened. On that occasion the change which had taken place in the conditions that had so long prevailed was recorded and emphasised—a change from supplies of doubtful sufficiency to abundance; a change from somewhat inflated quotations for common tea to a reasonable price, with its invariable accompaniment of increased demand for the finer qualities: and a change from a stock too low for the trade's convenience and security to one some 20,000,000 lbs. heavier. The probable effect of these changed conditions was discussed, and for reasons given the conclusion was reached that in existing circumstances what had occurred was the best thing that could happen in the general interests of producers, the trade and consumers. The position and probable policy of importers were examined, and while it was recognised that the Ceylon growers would pursue their usual course of freely selling, but would soon have much less to offer, it was suggested—upon information about the crop possessed—that the Indian producers would have to sell for six months at an average rate of 50,000 chests per week.

The sequel was interesting. It disclosed a difference of opinion as to the need for this being done and the wisdom of it, but our estimate could not be reduced—indeed, it was only 2,500 chests per week more than the average of the six months' corresponding sales in 1911-12—and now it is necessary to extend it a little, and, with knowledge that Indian's output may be so good as to give 20,000,000 lbs. increase upon the previous crop, to anticipate weekly auctions averaging 55,000 chests of Indian tea alone, unless some of the large growers follow the good example set at the beginning of 1909 by the Doears Company and three others, and dispose of a large portion of their crops for forward delivery by private contract. How will the market stand such an ample supply, and what will be the price of tea three months hence? No one can answer these questions, because the result will be greatly influenced by the quantity that Ceylon succeeds in contributing; by the Bank Rate; the experience to be gained as the weeks pass as to the extent to which our home and foreign trade expands with cheaper tea and plenty of it, and as to the quantity deflected from London by direct purchases made in Calcutta and Colombo or through transshipment.

Uncertainty as to the future of prices is enhanced by what has been taking place in the London market during the last six weeks. All the Ceylon and Java tea that could be marketed has been promptly offered at auction; the Indian growers have sold at the rate of 59,000 chests per week: the buyers have been called upon to handle and finance more than ever before; their physical powers and time, as well as their means, have been severely tried yet up to the end of last week there has been a sustained and brisk competition, with a frequent tendency for prices to improve. In the meantime, there has been no more than a very small increase in deliveries for export to give encouragement, nor such an improvement in quality as to attract buyers, except in some of the receipts from Ceylon. What is the explanation of a market and prices so such stronger than some of the importers and their brokers expected?

Inquiry into the reason of the confidence shown by the buyers at large discloses an interesting diversity of opinion. It is thought by some to be

due to an extensive business done by the wholesale traders with their retail customers in town and country, who have been "stocking up," mindful of their recent disagreeable experience, when they had too little—and it is true that whenever the retailers are buying freely from dealers and blenders there is activity in Mincing Lane; by others it is thought that the buyers do not consider the crop of such poor quality as it was announced to be beforehand, and find it good enough for their purpose and cheap; some suppose that the buyers, who see that China supplies are reduced and limited, are apprehensive that Ceylon shipments may fall back to the 1910 level, and that they will not nearly reach the dimensions of the last four months of 1911, when an unexpected addition of about 8,000,000 lbs. was made; and there are others who think that the market has been influenced by the rumours circulated for a while that the Indian crop had received a check and that no great increase from that source could be relied upon.

The last explanation deserves looking into, because it implies that the market has been propped up and has stood upon an insecure foundation, which we do not believe to be the case. The smaller buyers, both for home trade and export, have always been liable to be moved and influenced by such reports, but useful as these buyers are, they no longer have the power of affecting the trend of prices, which now depends upon the action of a comparatively few large operators, perhaps a round dozen all told, embracing the largest of the wholesale dealers, blenders, packet companies, multipleshop owners, caterers and co-operative societies. Their stake in the tea trade is so large that they have their own sources of information; they are fully informed respecting crops, exports and prospects, and their continuous support to the London market is alone competent to keep a sustained movement going through several consecutive weeks. This support has been given, and with full knowledge of the position and outlook.

Has any probable explanation been overlooked? There seems to be one; it will sound extravagant, perhaps, to those to whom the idea has never occurred, yet there is much to be said for it, and no suggestion need be brushed aside that may help to explain why tea remains so near to the level of the average price ruling during the last two years, when by reason of the complete change in the statistical position, and the alleged inferiority of so much of the supply, none but the very best ought to be worth its present value—theoretically, that is to say. The explanation we offer is that no comparison between this year's prices and those of the last eighteen months or two years is valid, because it was only through quite exceptional circumstances that tea did not advance many pence per lb. higher than it actually touched. There were times when the position was such that if tea had been coffee, sugar, cotton or any article in which there are "term markets" and facilities for speculation, it might have easily been cornered by one or two bold operators and a new level of price created—for a time only, to be sure, yet so high as to make our present quotations seem quite low. It was well for all concerned that nothing of the sort occurred, as there is nothing that the tea trade dreads more than sudden or severe fluctuations caused by the activities of speculators; nothing that the wisest amongst its leading men in the past have more regularly discouraged. To this freedom from speculation was added the resisting power against rising prices that the tea buyers have always shown they can exercise, and the care taken by responsible writers, who knew what a strained position existed, not to say more about it than was necessary at the time.

It can now be said that an actual scarcity of tea was in sight a year ago, and it led to the value of the common tea essential to retailers everywhere,

because it is the cheapest and most demanded by the public, being raised above the point touched for about ten years. Gradually there came into view China's increase of 10,000,000 lbs., in its exports, the enlarged supply from Ceylon already referred to, and Java's addition of above 1,000,000 lbs. per month to its former output; the buyers kept their heads and their money, and by working on the smallest possible stocks they pulled through a most difficult situation. How are they situated now?

Their position and the general outlook seem to be entirely reversed, yet so far they appear to regard it with composure; possibly because the lowered price of common tea promises to make trade larger and more profitable; possibly—although it will sound like a paradox—because the heavy selling by importers inspires confidence. Long observation, however, has taught that teabuyers are nervous and shy when producers hold back supplies from the market, but operate with confidence when they do the reverse and let them out freely, as they are doing now. Interest in the market's development will quicken as each week passes; receipts from India during the next six weeks must be heavy, and the stocks may seem unusually large in December; the slack time at the turn of the year will be approaching, when tea traders have other things to attend to, and the buyers would like the sellers to give them three or four weeks' rest while they prepare for the activities of the new year. A somewhat trying time may possibly be in store for those who have nothing but low grade tea to sell, but if they have to pass through it the position of every other branch and department of the industry and of the trade will be rendered more secure and the way be prepared for a free and elastic market in the coming year.—*Financial Times*, 25th October, 1912.—*Indian Planters' Gazette and Sporting News*.

A NEW COVER CROP,

The following is taken from the first number of the *Agricultural Bulletin of the Federated Malay States*, which is a new publication issued by the Department of Agriculture of the Federated Malay States and the Planters' Association of Malaya. The plant referred to is closely related to the plant called the yam bean (*Dolichos Lablab*) in the West Indies:—

During the past eighteen months seeds of some thirty varieties of plants have been procured from India, Philippine Islands, Barbados, Antigua, etc., for the purpose of attempting to secure a cover crop for this country which would fulfil the necessary requirements. After a long series of experiments I have come to the conclusion that one of the cover crops that may possibly meet with success is Horse Gram *Dolichos biflorus*.

Dolichos belongs to the family of the Leguminosae and is either Sub-erect or twining in habit. It is largely cultivated in South India and is wild in the Himalayas. It is stated that on the plains of India this pulse is grown either as a green manure or as a cattle food and fodder, and that few Indian crops are perhaps more valuable in this respect than the horse gram, especially when grown as a green manure. Its great value in this respect lies in its power, in common with other leguminous plants, of fixing atmospheric nitrogen in the soil through the agency of bacteria contained in the root nodules and by so doing it increases the fertility of the soil and indirectly the growth of the rubber growing amongst it. Being a close-growing, dense shading plant it keeps the surface soil damp and prevents it from being baked by the heat of the sun.—*Agricultural News*.

COFFEE.**Coffee Estimates should be Reduced,**

SAO PAULO CROP WILL NOT EXCEED 10,000,000 BAGS.

Frost Does Severe Damage—Danger of Very High Prices—Shipping Subsidy Situation—Financial Problems Connected with Coffee Valorization.

Rio De Janeiro, October, 22.—Reports are now coming in with regard to the damage that has been done to the coffee crops by the recent frost. First of all, to take the State of Sao Paulo, it would now seem reasonable that former estimates should be materially reduced; the growing crop, it is thought, will not nearly reach 11,500,000 bags, while the probabilities are that it will not exceed 10,000,000 bags.

The damage done by the frost was varying in degree. Thus a large number of young trees have been killed; other trees have been scorched and will not bear next season; while others, again have been, as it were, burned and will not bear for two seasons. It will thus be seen that the frost is far-reaching in its effects and will have its influence not only on the growing crop, but on two future crops into the bargain.

In the State of Minas the frost was also severe and a good deal of damage was done, though so far no estimates are to hand on which any reliable statements can be based.

In Parama, where there has been a great deal of new planting the young trees have suffered terribly, and in many cases whole batches have been killed.

The danger now would seem to be that prices will be pushed so high that consumption may be seriously affected.

The weather is warmer, and if there is no more frost the second flowering, now on, may set and finally ripen. The conditions do not indicate more frost, but it is impossible to say, as it is not yet too late for a further heavy fall in the temperature.

THE FINANCES OF SAO PAULO.

The Secretary of Finance of the State of Sao Paulo has presented a statement to the State Legislature dealing with the finances of the State for the first six months of the current year.

He states that during the period in question revenue collected amounted to Rs.35,905: 055\$151, or £2,393,670. This includes ordinary and extraordinary revenue and the surtax on coffee. The last named gave Rs.8,363: 148\$391, or £557,543. The revenue for the whole year is estimated at Rs.69,730: 000\$000, or £4,648,666, so that it will be seen that the first six months have given just about half this sum. As, however, the second half of the year usually yields more revenue, it is reasonable to expect that the actual amount collected during the fiscal year will eventually exceed estimates.

Expenditure during the period is given as Rs.39,211: 925\$000. or £2,614,128, while the value of special credits opened was Rs.18,338: 805\$000, or £1,222,587.

A sum of Rs.24,255: 190\$000, or £1,617,012, is carried forward to the second half-year.

Turning to coffee, the Secretary of State says that the stock held by Government at the beginning of 1912, carried forward from the year 1911, was 5,101,578 bags, of a value of Rs.172,164: 242\$000 or £11,477,616. This stock still remains on the books at the end of June, as the sales made during the first six months of 1912 have not been deducted, owing to the fact that the product of the sale has not as yet reached the State Treasury. As a matter of fact, the number of bags sold in the various consuming markets was 700,000, the price obtained being 68,880,000f., equivalent to Rs.41,328: 000\$000, or £2,755,200.

The actual stock on June 30 was 4,401,578 bags, representing a value of Rs.149,064: 242\$000, or £9,37,616.

According to the statement, valorization expenses still to be amortized amounted at the end of June to Rs.61,581: 685\$000, or £4,105,445. Deducting from this amount the value of the 5f. surtax collected, *viz.*, Rs.8 363: 148\$000, or £554,209, there remains an amount of Rs.53,218: 537\$000, or £3,547,902 to be paid off. From this may be further deducted the profit on the recent sales, which is put at Rs.12,000: 000\$000 or £800,000. As a result the amount actually outstanding is therefore Rs.41,218: 537\$000 or £2,747,902. The State debt on June 30th amounted to £10,340,653.—*The Journal of Commerce and Commercial Bulletin.*

SYNTHETIC CHANCES ARE POOR.

Dr. L. E. Weber, one of the most distinguished of American chemists, who for years has been interested in artificial rubber production, does not believe Synthetic rubber will within the lifetime of most of us become commercially possible. He made that confession at the conference held in New York in connection with the Rubber Exhibition. There are obstacles in the way of polymerisation which alone make Synthetic rubber commercially impracticable. If commercial synthetic rubber ever comes he is convinced the advantage in the fight will still all be with the plantations. "In the case of Indigo, the synthetic product had practically no competition to meet. The production of natural indigo had been carried out in the crudest possible fashion and the methods of obtaining the dye from the plant were even more crude. For some extraordinary reason, although the production of this dye stuff was of such extreme value to the textile industry, it always remained in the hands of the ignorant native. Had the same amount of energy and skill been applied to the indigo plant that is now being applied to plantation rubber, the victory of sytheric indigo would still be in doubt." In Dr. Weber's opinion there are enormous opportunities for the plant physiologist in the cultivation and production of rubber. So far very little has been done in this direction as the plantation industry is still in its infancy, but it seems more than probable that careful experimentation will devise means whereby the yield of rubber problem is more complex, but, said, Dr. Weber, "this field of investigation is still waiting for the pioneer and I cannot help feeling that the possibilities are indeed large." By the time, if ever, that Synthetic rubber is able to come forward as a commercial proposition, science on the plantations, will have done a vast deal to destroy its chances of success, and Nature, by her prolific output, will have done the rest.—*Grenier's Rubber News.*

RUBBER.

Mr. Baxendale on the Rubber Industry.

Mr. Cyril Baxendale in an extremely interesting address on the plantation Rubber Industry delivered before the Rubber Conference at the New York Exhibition said it was remarkable, seeing how civilization is now dependent on plantation rubber, that the profitable cultivation of rubber should for years have been open to doubt. The earliest trees planted by Sir Hugh Low reached maturity many years before it was realised that were capable of yielding a sufficient quantity of latex to make regular tapping worth while. Mr. Baxendale's only explanation for this is that tapping was relegated to the Sakeis who adopted the methods they applied to the collection of wild rubber they hacked with choppers, and the results achieved were insufficient to tempt any capitalist to put money into the business. The primary knowledge of how these trees might be made profitable came from "our scientist friends," said Mr. Baxendale, and Mr. H. N. Ridley's appointment in 1888 as Director of the Singapore Botanic gardens was now considered a Red Letter day. To the brothers Kindersley belongs the honour of first planting rubber on a commercial scale in Malaya: they were followed by W. W. Bailey and others. Slow development was due to lack of cash, not of enterprise. It is all like a romance to-day. "We were all coffee or sugar planters" and Mr. Baxendale, struggling for a bare, very bare existence. Some of us may have had the privilege of being on terms of a nodding acquaintance with men of means, but not many of these could recollect that rubber was useful for any practical purpose except the erasure of pencil marks." How many of the few who had seen or heard of Charles Rolls travelling in a noiseless carriage preceded by a man with a red flag as a danger signal, realised that "this object of merriment was the forerunner of the greatest mechanical industry of the age, or if they did, would not at any rate have found it a reason for supporting the schemes of would-be rubber planters."

It required a good deal of courage on the part of a few speculative or far sighted persons to sink a portion of their savings on the new enterprise. When the outside world woke up to the potentialities of rubber the boom probably exceeded that which heralded railway development seventy years ago. "It can only," continued Mr. Baxendale "be compared with another that occurred in the reign of our late Queen Anne in connection with a venture known as the South Sea Bubble. Well *our* Bubble has since deflected somewhat I am glad to say but it has not burst," and for that we have to thank the planters who kept their heads in spite of somewhat embarrassing attentions.

Turning to some of the reasons why Malaya has attracted more support for rubber growing, Mr. Baxendale mentioned first its regular rainfall. "It is commonly said that there are two reasons in that country. One is the wet and the other the d—d wet season." In 14 years on the Jugra Estate he has never known a month without rain. Monthly shortages in outputs are sometimes attributed to drought, but according to Mr. Baxendale Malaya has yet to experience the true meaning of the word "drought." There are few days in the year when it is too wet to work and that of course gives Malaya a great advantage over Brazil. As for health, there has been considerable change for the better, and if many of the plantations can hardly yet be described as health resorts, improvement continues under the influence of medical discoveries. Mr. Baxendale paid a compliment to the over-worked and not over-paid Survey Department. Rent and Export Duty have driven a certain amount of capital to Java and Sumatra, but the success of

the rubber industry is largely due to the confidence inspired by the existence of and absolutely honest and conscientious public service. "Judging by past experience in time of adversity we may reasonably expect that if our burdens become too grievous to be borne, we shall obtain the relief necessary to meet the stress of competition." Dealing with planting and cultivation, Mr. Baxendale said that "from time to time there crops up something almost as bad as weeds." He referred to the "wearisome controversy" as to the desirability or otherwise of allowing grass to grow or of cultivating some cover plant which will extinguish weeds. "I have experimented with small areas under grass but the results have not shaken my belief in clean weeding, to be followed by digging or ploughing whenever there is a sufficiency of funds and labour. With a sufficient supply of the sinews of war, the planter can hold his own and after three or four years, aided by the shade then afforded by his trees, he becomes master of the situation." With the longed for harvest come thoughts of the factory. "When I started tapping, the word factory had not been invented in this connection. I began by settling the latex in my washing basin, rolling the rubber with a beer bottle (an empty one) and dried it on the verandah. Then acting under strong domestic pressure I moved the scene of operations to the stables and carried on there until there was no room for the horse. Next I built a little shed and bought a hand mangle. The next move was to the factory of to-day."

There were many other illuminating items in Mr. Baxendale's excellent address. Speaking of cost of production, which high salaries of superintendents and high wages of coolies have swollen he said it seemed to him only right and proper that those responsible for supervision should enjoy some of the fruits of the industry when the industry could well afford it. In estimating yields, calculations should be based upon the yield per acre. A well-known botanist who studied the *Hevea* in its native land used to urge us strongly to plant at 40×40 , i. e. 27 trees to the acre. If Mr. Baxendale had taken the advice he found that he would have harvested less than half the quantity of rubber he has obtained from a given area. As for labour prospects, "It is true," said Mr. Baxendale "that most plantations are at times short of labour, but he thinks this must generally be attributed to the Managers' desire to keep down expenses. Tamil coolies are easily recruited where estates are not for some reason unpopular. The success of such estates will depend on the attractions they can offer to Chinese or Javanese, who can be secured in any number—at a price." "It must be remembered that by doubling the cost of labour we do not double the cost of production. Generally speaking labour is less than one half, if home charges are included, and as trees come into bearing labour rates can if necessary be materially increased without raising the cost of production when the trees attain maturity." Mr. Baxendale follows experiments in manuring with interest but his own opinion is that for some years to come at least systematic cultivation of the soil will be of more value than any manure.

Reviewing various estimates as to production, Mr. Baxendale said that the struggle between plantation rubber and wild rubber does not appear to be very imminent: the most pessimistic calculation gives an increase in consumption of about 14,000 tons per annum and at that rate the requirements six years hence will amount to 184,000 tons annually. The prosperity of the plantation industry, Mr. Baxendale reminded manufacturers, depends on the growth of their industry. "We can" said Mr. Baxendale in conclusion, guarantee an enormously increased supply of rubber and will in future years be content with a much lower price than now prevails. What we

want to know is whether there is to be a glut in the market and a scramble to sell with every successive increase in the supply. Perhaps, gentlemen, you can allay the misgivings of those planters with the weaker faith in the future of the industry and can send them through me assurances which will encourage them to hope for a continuance, even in a modified degree, of the prosperity we have recently enjoyed, a prosperity which, I believe, has never been rivalled by the agricultural industry in all the history of the world."

Mr. Baxendale's address was followed with keen attention by a very large body of chemists and manufacturers as well as representatives of producing interests. It was agreed that it gave them a most valuable idea in small compass of what is being done by Mid-East planters, and in the discussion which followed a good deal was said about the use of harmful chemicals in coagulation. Mr. Baxendale was able to reassure the manufacturers and chemists and to prove that only acetic acid is used by the largest producers. Vendors of patent coagulants receive little encouragement. He will of course take the first opportunity of communicating to plantation managers the views brought out by the discussion, and there can be no doubt that the debate will have served a most excellent purpose by enabling planters and the American manufacturers to understand each other's aims better.—*Grenier's Rubber News*.

RUBBER FAILURES IN OTHER LANDS.

H. and U. which is a South American Company was floated in May 1910 with a flourish of trumpets. The capital was £195,000. The front page of the prospectus was headed 1,070, lbs., of rubber are now available for collection. This was underlined. Here is a greater than Linggi, Pataling or Selangor remarked the unwary. And the statistical pundits were able to prove that H. and U. was one of the finest undertakings ever offered to the public. Even the veriest Simple Simon could tell that, for H. and U. owned 400,000 acres of land. And the purchase price was only £140,000 or 7 per acre. And the Chairman told the shareholders that rubber could be brought into bearing at a much lower cost than the poor Eastern Plantations. And unfortunately they believed in him. The prospectus wallowed in fine promises. Rubber alone from a small portion of the property was to bring in annually £54,094. And the H. and U. brand had been well known in Mincing Lane for years. But one statement was difficult to swallow. The vendor Mr. Uribe had relinquished the management for a post in the Columbian Civil Service. This was on a par with Mr. Rockefeller giving up his interests in Standard Oil for a post in an American Post Office. All the visions have now disappeared. The rubber still remains uncollected. The capital had vanished. The prospectus stated, "the various members of the families owning the properties and occupying prominent positions in the Church and Diplomatic service are men of wealth, and as their other interests make it impossible for them to give personal supervision to the business, they have decided to transfer their properties to this Company." These distinguished persons are now indulging in the pleasures and delights of Paris, Lima and Rio, while the English shareholders are revelling in the delights of liquidation.—*Grenier's Rubber News*.

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DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

A Special Meeting was held at the Meppadi Club, on Wednesday, November 27th, 1912.

PRESENT: Messrs. Darkin, Egan, Gillatt, Macbain, Macleod, G. R. C. Parker, Powell, Stewart, Vernede and C. E. Abbott, (Honorary Secretary.) Mr. Gillatt in the Chair.

1810. A ballot was held for the election of a Member of Council to represent the Planting Community. The Chairman announced that Mr. E. F. Barber had been unanimously elected.

The Proceedings then terminated with a vote of thanks to the Chair.

(Signed) T. S. GILLATT,

Chairman.

(„) C. E. ABBOTT,

Honorary Secretary.

Nilgiri Planters' Association.

At a General Meeting of the Nilgiri Planters' Association held at the Armoury, Ootacamund, on Thursday, the 14th November, 1912.

PRESENT.—Messrs. E. F. Barber (in the Chair), J. S. Nicolls (Honorary Secretary), W. Rhodes James, E. Hardy, J. H. Pascoe, C. H. Brock, C. Gray, J. Aird, G. Oakes, A. K. W. Downing, S. Bayley, L. L. Porter, R. Stanes, W. A. Cherry, W. Deane. Visitor:—Messrs. E. H. Jones, Deputy Superintendent of Police, N. Hornsby, and D. Elkington.

43. *Proceedings of the last meeting* were confirmed.

44. *Report of the Delegates to the U. P. A. S. I. Meeting.*—The following report was read:—

U. P. A. S. I. Delegates' Report.

As your Delegates we attended the Annual Meeting of the United Planters' Association of S. India held at Bangalore on 12th, 13th, 14th and 15th August 1912.

The Annual Report was what could only have been expected, a very brief summary of the work done during the year, the new Secretary only having taken over charge a few days previous to the meeting.

The Chairman's opening speech was tactful and to the point and his re-election as Chairman for the second year in succession was proof that the Delegates appreciated the way he had faced and overcome trying difficulties. Mr. Abbott has now been elected Chairman three times. Mr. Romilly being the only other member of our community who has had a similar honour conferred on him by his brother planters.

Planting Member.—Mr. Hamilton was unfortunately unable to be present.

We do not think it is necessary to write a lengthy report. A considerable amount of the proceedings have appeared in the daily papers and the Annual Book of Proceedings has been already published.

Scientific Officer's Report.—You will have read Mr. Anstead's summary of work done during the year. It was agreed upon that his programme for 1912-1913 should be in accordance with the resolution carried last year. There was considerable discussion on certain matters of interest; especially we should mention that under the head of "Fertilizers, Coffee Pulp and Composts," Mr. Brock, one of your Delegates, proposed a resolution that Mr. Anstead be requested to carry out further experiments on the same line which was carried.

Verification of Manure Analysis.—The Scientific Department will now undertake this. We would suggest that the samples be sent through your Association and that the results be made known to all members of your Association. It would not be necessary to send up more than one sample of any one manure.

Planters' Chronicle.—We voted according to your instructions that this should be continued as a weekly paper.

Bulletins.—We voted for Mr. Plowden's resolution.

Telegraphs.—The matter of cheaper construction for lines to planting districts was considered and the outcome of the resolution passed at the meeting is published in the current number of the *Planters' Chronicle*.

That the Telegraph Department have under consideration a scheme for reducing the cost of Branch Telegraph lines, will be of interest to members who cannot get a line without a guarantee.

Coffee Hybridisation.—There was no lengthy discussion on this matter which we regret, as it is a matter of particular interest to a great number of the members of your Association. The Committee of your Association are ably looking after your interests as regards the Experimental Plot on the Nilgiris. They will no doubt have accumulated many points of interest before the next Annual Meeting of the U. P. A. S. I.

The Indian Tea Cess.—A resolution was put by the Chair that the cess be renewed for another five years and was carried unanimously. Mr. Jackson spoke very much to the point. There is no doubt that the Fund has done good work and may be expected to continue doing so. We have been assured by prominent promoters of our industry that years of plenty lie before us. If so we shall not feel the small amount we contribute out of our prosperity.

Export duty on Bones.—This matter was ably dealt with by Mr. Barber and it is one he does not mean to lose sight of. He has enormous obstacles in front of him, but they are not likely to frighten him.

Labour enticement, Recruiting and Emigration.—This is a matter you have had much before you of late. There is little doubt that there is a growing opinion amongst Associations that labour matters are not receiving sufficient attention. We would remark that without ample labour it will be impossible to derive full benefit from the Scientific Department. Mr. Hughes and Mr. Hamilton both gave instances of inducements that were being made by "The Federated Malay States," and "The Government of Zanzibar" to emigrants. We know that Ceylon recognizes the position by the ever increasing number of its recruiters. It is time we tried to fortify our own position and not rest content to see coolies emigrating from districts from where we have in past years looked for labourers. Ceylon has found that its old recruiting grounds cannot supply its ever-increasing demands, and it now has well-organized agencies in the midst of those districts which we once thought were our own—and even more—their agencies are even sitting on our door steps. A Scheme of Registration was put before the Meeting. A Sub-Committee was appointed to receive the opinion of the various Associations to try and harmonize this into a workable scheme. We fear they have a hard task in front of them. It may be impossible to present a scheme which would be unanimously adopted; but let us make a commencement.

Non-Service of Warrants.—Mr. Brock put this before the meeting and his resolution was carried, the Anamalais voting with us. The Wynaad voted against the resolution, because they got hand warrants without any restriction. It seems a pity that the same Act should be worked under different conditions.

Election of Office-Bearers.—The election of Office-Bearers we think a wise selection. The election of Mr. Abbott as Chairman was a most popular one. We also voted for Mr. Barber as Planting Member, which was in accordance with the voting of members relative to the Circular sent to all members of your Association by your Honorary Secretary.

Proposed by Mr. W. Deane and seconded by Mr. L. L. Porter: "That a hearty vote of thanks be passed to the Delegates, Mr. C. H. Brock, Mr. E. F. Barber and Mr. J. S. Nicolls, for their services and that the report be printed in the proceedings."—Carried unanimously.

45. *U. P. A. S. I. Circulars.*—Laid on the table.

46. *Act I of 1903.*—Read High Court ruling Criminal Revision Case No. 462 of 1911 in reference to case No. 83 of 1911, No. 418 of 1911 on the file of the Stationary Sub-Magistrate, Coonoor—showing that a contract entered into with any person to perform a special agricultural work (in this instance weeding) fails under Act I of 1903 and not under Act 13 of 1859 and not as understood in G. O. No. 558, dated 28th March, 1906.—Recorded.

Honorary Secretary's letter to the District Magistrate with reference to C. C. No. 918 of 1911 (No. 25 of meeting held on 30th May 1912 and No. 37 of meeting held on 18th July 1912), and the District Magistrate's reply No. 510 M. of 1912 dated 17th August 1912.—Recorded.

47. *Non-Service of Warrants.*—Read Honorary Secretary's letter dated 24th July 1912 to the Inspector-General of Police, with the latter's reply, dated 5th August 1912.—Recorded.

G. O. No. 1315 was laid on the table. Read letter No. 581 M. of 1912 dated 24th September 1912, from the District Magistrate enclosing instructions to Taluq Magistrates. Recorded.

Read U. P. A. S. I. Circular No. 38 dated 12th November 1912.—Recorded.

Proposed by Mr. W. Deane and seconded by Mr. A. K. W. Downing: "That the Honorary Secretary be instructed to ask Government to have all G. O.'s, that affect the Planting industry printed in English in the Nilgiri District Gazette."—Carried.

48. *Recruiting*.—Read U. P. A. S. I. Chairman's last letter to the Ceylon Labour Commissioner in continuation of correspondence published in the *Planters' Chronicle*.

49. *Registration*.—Read Mr. Porter's letter, dated 18th October, 1912, Mr. Rhodes James letter, dated 6th November 1912, Mr. A. G. Nicholson's letter dated 28th October 1912 and Mr. R. Stanes' letter dated 16th October 1912 with others. After a long discussion the following resolution was proposed by Mr. Rhodes James and seconded by Mr. W. A. Cherry:—"That this Meeting thinks that the views of the other District Associations should, if possible, be unified into the simplest scheme considered workable, that this be put before Government by the U. P. A. S. I., to ascertain their views on the subject as it is fully recognised that this labour problem must be faced and dealt with through the U. P. A. S. I."—Carried.

50. *Roads and Communications*.—The following resolution was proposed by Mr. R. Stanes and seconded by Mr. W. Deane:—"In view of the toll-gate recently erected on the Kartary road, the planting members of the District Board be asked to represent to the Board the unsatisfactory state of the road from the Kartary road toll-gate to the Droog, passing through Glenmore, Glendale and other estates, which estates are willing to render assistance in the matter of road margin and in facilities for collecting materials."—Carried.

51. *District Board Membership*.—Proposed by Mr. C. H. Brock and seconded by Mr. S. Bayley: "That the Honorary Secretary be instructed to write to the President District Board calling his attention to the District Board resolution No. II, dated 4th September 1910 and request that all members of the District Board shall be proposed or nominated by the Nilgiri Planters' Association."—Carried.

52. *Experimental Plot*.—Mr. Gray addressed the meeting about the piece of land granted by Government and the method of work being carried out.

53. *Railway Freight*.—In reference to No. 39 of meeting held on the 18th July 1912.—Read Honorary Secretary's letter of 24th July to the General Traffic Manager of the S. I. Railway and the latter's reply to same, dated 16th August 1912.—Recorded.

Proposed from the Chair.—That the matter of reduction of railage on Tea seed be referred to the Indian Tea Association through the U.P.A.S.I.

54. *Cattle Permits*.—In reference to No. 41 of meeting held on the 18th July 1912.—Read Honorary Secretary's letter of 24th July 1912 to the District Forest Officer and the latter's reply to same, dated 9th November 1912.—Considered satisfactory and recorded.

55. *Burial Ground*.—Lease to be held and renewed by the Nilgiri Planters' Association.

56. *Scientific Department*.—Read Mr. Anstead's letter of 29th August and the Honorary Secretary's reply of 31st August 1912. Members were requested to inform the Honorary Secretary as soon as possible if they wish to have samples of fertilisers analysed.

57. *Planters' Benevolent Fund*.—Mr. Morrison's case.—Read and recorded correspondence.

58. *New Member*.—Mr. Hedde,—Proposed by Mr. E. F. Barber and seconded by Mr. J. S. Nicolls, was duly elected.

59. *The late Mr. Edminston*.—The Honorary Secretary was instructed to write to Mrs. Edminston expressing the Association's deepest sympathy in her loss. Mr. Edminston was a well-known and honoured member of our community for many years, a member and Honorary Secretary of this Association, a keen sportsman and good friend. His death will be sadly felt by those to whom he was known.

Votes of thanks to the Chair and the O. C. Nilgiri Volunteers for the use of the room terminated the proceedings.

(Signed) E. F. BARBER, *Chairman*.

(„) J. S. NICOLLS, *Hony. Secretary*.

60. Election of additional member in the planting interest to the Legislative Council of the Government of Fort St. George.—

Mr. R. Stanes occupied the Chair

Mr. E. F. Barber was elected unanimously.

(Signed) R. STANES, *Chairman*.

(„) J. S. NICOLLS, *Hony. Secretary*.

Papers on Table.—Year Book of the Planters' Association of Ceylon, Bulletin of the Bureau of Economic and Social Intelligence, Vol. 1 to 3, Bulletin of the Bureau of Agricultural Intelligence of Plant Diseases, Vol. 4 to 6; Leaflet Nos. 1 to 3, Agricultural Department, Madras; Report on the Flax experiments 1911-12. Third report on the Introduction of Improvements into Indian Agriculture. The cultivation of lac in the plains of India. Directions of the cultivation of Eri silk. Memoirs of Dept. of Agriculture Vol. 2 to 6. Advertisement in the United States No. 96 and 127 T. C. Book of Proceedings of the U. P. A. S. I. Meeting 1912.

LABOUR.

I understand the Emigration Agent for the different Crown Colonies are experiencing great difficulties just now in recruiting labourers for their respective governments notwithstanding that their requirements are so much less than they were a few years ago. The Hon'ble Mr. Gokhale has, I understand, been trying his best to get the Government of India to insert in the articles of indenture, to which the labourers have to subscribe, particulars of the penalties to which they are liable in the country to which they may go. It seems to me only fair that the emigrant should know what he is letting himself in for before he finally agrees to emigrate. I am told on good authority, that in Fiji the Indian labourer is treated with very little consideration and is severely punished for the most trivial offence.—*Commerce*.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Ceará Rubber.—The following cutting from the *Evening Standard* of 1st November has been kindly forwarded to me from a correspondent at home.

“A new and somewhat serious disease has been found attacking the Ceará Rubber trees in Brazil. It is characterised by the production of large swellings on the twigs and branches, often four times the diameter of the branch attacked, and most of the swellings give rise to a number of young shoots, which in some cases form “witches’ brooms.” The cause of the trouble is a rust fungus originally discovered on wild manihot trees in Brazil in 1892. The disease is somewhat wide spread in Ceará. When trees are attacked by it the flow of latex diminishes, the diseased branches drop off, and death follows. Countries importing seeds from Ceará should insist on disinfection.”

This once more emphasises the necessity for world-wide legislation to check the possibility of importing plant diseases from one country into another. These particular diseases are little understood and most difficult to control, familiar instances being the witches broom’ disease, which did so much harm to cacao some years ago in Surinam, and the ‘spiki disease’ of sandal in Southern India.

Wounds in Trees.—An instructive article from the pen of Mr. W. J. Bean appeared in a recent number of the *Kew Bulletin* in which it was pointed out that hollow places in the trunks and limbs of trees formed by decay are better filled up. If the cavity is small and properly treated decay is often arrested and new bark encouraged to grow over the filled up cavity. This prevents the entrance and accumulation of moisture and thereby removes one of the chief predisposing conditions of decay. The author says:—“The majority of such decayed hollows have their origin in snags left by branches broken off that have rotted back into the trunk because the new bark has not been able to grow over and heal up the wound. Branches removed by design or broken off by wind or accident should always be sawn off close to the trunk, and the sawn surface should then be coated over with ordinary coal tar. If a snag or stump is left the bark cannot grow over it; damp, fungoid parasites and decay sooner or later follow and gradually find their way towards and eventually into the trunk.”

This is especially important in the case of Rubber trees, but it is also worth while attending to wounds in Coffee both when it is topped and when it is stumped. I have often found on splitting open the stem of a dying or sickly Coffee tree that it is not only bored but the centre is decayed and stained from the effect of an old wound made many years before but still open. Such decay results in a kind of “blood poisoning” which keeps the tree in an unhealthy condition. During a recent visit to Coorg I was shown the results obtained with Jodelite as a preservative for wounds and this proves much better in every way than Coal tar. It resembles the Rosin Oil which I recommended some years ago but failed to be able to get in India. Further information on the subject of the treatment of wounds in trees will be found in the *Planters’ Chronicle*, Vol. IV, p. 281. Vol. V. p. 71, 501, Vol. VI. p. 763.

R. D. A.

INSECT NOTES.

Plant Protection in the United States.

The information given below is copies from Circular No. 37. from the Office of the Secretary of the United States Department of Agriculture and is presented herewith as likely to be of interest to readers of *The Agricultural News*. The Circular includes an introduction and the development of points under four headings ; the introduction and the first of these parts are given herewith. The West Indian Colonies are equipped with legislative enactments by means of which it is sought to prevent the introduction of pests and diseases along with imported plants. The instances quoted as illustrations of the conditions calling for legislation can hardly fail to impress the mind of the reader with the importance of these imported pests and the necessity for preventing the introduction of additional forms with similar capacity for harm.

Introduction.—The effort to secure national legislation to keep out new and dangerous insect pests or plant diseases which may be brought in with imported nursery stock has been actively favoured by the Department of Agriculture, just as the department in the past has promoted and secured legislation enabling it to exclude from this country diseased animals or to quarantine and stamp out animal diseases whenever such have appeared. In the case of domestic animals, the exercise of these powers has brought enormous benefit and has worked entirely satisfactorily to the live-stock industry. It is reasonable to believe that like benefits to fruit and forest interests, included the nursery business, will undoubtedly come from similar legislation to exclude insect pests and plant diseases.

The mere statement is sufficient to show the need, but a strong concerted effort is being made to array the nursery trade of this country against such legislation and put this important industry in the very unfair attitude of opposing reasonable legislation, which is quite as much for its own protection as of the evident misunderstanding which is being broadly circulated in relation to the intent of the proposed act and of its probable manner of enforcement, and the groundless fear that the Secretary of Agriculture or his experts would take an unreasonable attitude towards the nurserymen. It seems desirable to make a fair statement (1) of the conditions calling for such legislation, (2) the history of the efforts to secure it, (3) an explanation of the scope and working of the Bill now before Congress, and (4) the relation of the Secretary of Agriculture and his assistants to the enforcements of such a measure.

Conditions calling for Legislation.—Practically all of the European powers have very stringent plant inspection laws, and, in the case of the United States, absolutely prohibit the entry of nursery stock. Apples and other American fruits are admitted only when the most rigid examination shows freedom from insect infestation. Canada and other important British possessions have similar protective legislation.

The United States is the only great power without protection from the importation of insect infested or diseased plants, and thus becomes a sort of dumping ground for European refuse nursery and ornamental stock. This does not often apply to the importations of the larger and reputable importing firms, but does apply to the poorly packed miscellaneous ornamental and other stock imported by department stores of large cities or that sent to this country to be sold under the hammer by auctioneers for whatever price may be obtained.

The immediate danger which led to the recent effort to secure legislation was the discovery in 1909 of the abundant importation and wide

distribution into the United States of nursery stock infested with brown-tail moth nests and occasional egg masses of the gipsy moth. During the years 1909 and 1910 such infested stock was carried into twenty-two states, covering the country from the Atlantic seaboard to the Rocky Mountains. During the first of these years no less than 7,000 winter nests of the brown-tail moth, containing approximately 3,000,000 larvae, were found in shipments into New York State alone—seed material enough to infest the whole United States within a few years. During the second of these years, 617 of these nests were found on nursery stock shipped into the State of Ohio, and a much larger number, approximately the same as the year previous, were again sent into New York. Smaller numbers of these nests, proportioned to the amount of nursery stock received, were sent into other States east of the Rocky Mountains during both of these years. Fewer brown-tail moth nests were received during the season just ended (1910-11) owing to the agitation in this country and more strict supervision by foreign Governments. These winter nests are, however, still coming in, and the danger is now perhaps even greater, for the reason that as infestation becomes more infrequent a laxity of examination is likely to result.

So far as possible, this stock, as voluntarily reported by Customs officers and railroads, has been examined and the brown-tail nests removed or destroyed by state authorities, or, where these were not available, by agents of the Bureau of Entomology of the United States Department of Agriculture. Undoubtedly many shipments have not been reported or examined, and it is quite probable that local infestation has already started at different interior points. The history of both the gipsy and brown-tail moths in New England shows that these insects may be present for several years without being noticed, slowly gain headway, and then suddenly develop their full power of destructiveness.

It is scarcely necessary to comment on the danger to this country from the careless introduction and wide distribution of these two orchard and forest pests. In a limited district in New England more than a million dollars a year has been spent for a long period in a mere effort to control these two insects, and the General Government is now appropriating \$300,000 annually to endeavour to clear them from the border of main highways and thus check their spread. These expenditures do not take into account the actual damage done, but they do serve as a measure of the danger to the whole country from the recent distribution of these two insects on imported nursery stock.

As further illustrations of the constant risk from lack of legislation may be mentioned two very recently introduced insects which will undoubtedly prove very expensive pests in future years. The European alfalfa leaf weevil, on the authority of the Entomologist of the Utah Experiment Station, Mr. Titus, was probably brought into Utah in packing of nursery stock or other merchandise from Europe. This leaf weevil has already destroyed much of the value of the important alfalfa crop of Utah, and is spreading into adjacent states. The other illustration is the oriental cotton scale (*pulvinaria psidii*), probably the worst scale pest of citrus and other sub-tropical plants in Southern Asia. This scale insect has recently been introduced into Florida on imported stock and is already well established there.

New plant diseases, against the entrance of which there is at present no bar, may even more seriously jeopardise the farm, orchard, and forest products of this country. Imported potatoes from Newfoundland are now bringing in the potato wart disease, which, wherever it has been introduced

in Europe, and also in Newfoundland, puts a stop to potato culture. The importation of white pine seedlings is now bringing in the European white pine rush, which, if established and disseminated, will destroy much of the value of our white pine forests. Absolute quarantine against these two plant diseases is the only means of keeping them out. The chestnut disease, now practically shown to have been introduced on trees imported from Japan, illustrates what may quickly happen from such unchecked introductions.

More than half of the important insect enemies and plant diseases now established in this country have been brought in on imported nursery stock, and new insect enemies and new diseases are being thus introduced every year. Twenty different insect pests, new to this country, some of them very formidable in the Old World, have been intercepted in the inspections of the imported material by this department this year, and this does not include the introduction of brown-tail moth nests and other European pests with imported seedling stock.

A properly enforced quarantine and inspection law in the past would have excluded many, if not most, of the foreign insect enemies and plant diseases which are now levying an enormous annual tax amounting to several hundred million dollars on the products of the farms and orchards of this country.

In spite of the many pests which have already gained foothold and the control of which will be a permanent annual charge on production there remain many other insect pests and plant diseases with equal capacity for harm which, fortunately, have not yet come to us, and it is to protect from these new dangers that legislation is now sought, not with the intention of prohibiting the trade in imported stock, but to throw such safeguards around it as will most protect both the importers and the subsequent purchasers of such stock.

The insect pests and plant diseases that have come in are probably here for all time, but certainly no reasonable objection can be made to the effort to safeguard the future. The conscientious importer will be benefitted, and the home producers, the dealers, and all the great fruit and forest interests will be protected by suitable inspection and quarantine legislation.—*The Agricultural News*.

STINGLESS BEES (?) ETC.

The clipping below seems to have seen having the run of the daily papers. We clip it from the *Detroit News* of Oct. 1:

The stingless bee has at last arrived, having been produced by an English apiarist named Burrows after two years of experiment. A description of the new bee, which has been received here, says that the hybrids are splendid workers, and are less liable to disease than the ordinary honey-producers. Burrows mated Cyprian drones with Italian Queens to produce the new bee, which, while possessing a stinger, can not use it as a weapon of offence.

Something like twenty years ago, when D. A. Jones brought the first Cyprian bees from Cyprus, the same or a similar claim was made, and there was just a grain of truth in it. The Cyprians, or a cross such as mentioned, seemed quite slow about getting on the "war-path;" but it soon transpired that, when once roused up, say by untimely meddling, they stung worse than any other bees we had. So much for newspaper canards—*A. I. R.—Gleanings in Bee Culture*.

SOILS.

The Practical value of Soil Analysis.

When soil analysis is mentioned, it is usually understood that an investigation and statement of the chemical and physical constitution of the soil are intended. In the part of the statement relating to the chemical investigation, first attention is paid to the content of the soil in more or less available compounds containing nitrogen, potash and phosphorus; while the information relating to the physical condition of the soil is concerned chiefly with the proportions that it contains of particles of different sizes, and with the quantities of these that, speaking broadly, are of a sandy or clayey nature. If all this information is properly understood and applied with a correct regard to its limitations, it is of the greatest use to the agriculturist. If it is thought to provide an absolute indication of the degree of fertility of the soil, and to show necessarily the plant food constituents that the soil lacks, its provision may be of little avail, and actually harmful.

A recent discussion of the correctness of the view that the analysis of a soil gives a ready means of obtaining an indication of its fertility, and of determining its manurial requirements, deserves notice here in the light of conditions and experience in the West Indies. First attention may be directed to the question—'to what extent does an analysis of a soil give an indication of that soil's fertility?'

The fertility of a soil is measured by its power to grow crops, and this power is most obviously limited by its ability to supply the plant food requirements mentioned already. It is not sufficient, nevertheless, for the soil merely to contain these bodies in adequate amounts. One matter of the greatest importance is that there shall be an ample provision of water to be taken up by the roots, and there are other essentials, such as proper aeration of the soil. It is not the purpose of this article to discuss these, it is only expedient to point out that insufficiency in any one of them prevents the proper use by the plant of all the others. Their useful provision depends, in turn, on such factors as climate, exposure and depth of soil, and drainage. The chief limitation to soil analysis is that these factors, obviously, cannot be determined in the laboratory. Even when they are known to the analyst and he is able to correlate them with the results of his investigation of the soil itself, they are quite insufficient to determine the fertility of any given area. They must be supplemented by the local knowledge, experience and judgment of one, such as a planter or investigator, who may be said to be agriculturally familiar with that area.

The difficulty does not end here, for the analyst up to the present is not able to give any complete information as to the availability of the food bodies in the soil: this may contain nitrogen, phosphates and potash in amounts that are far greater than those required by plants, but one or more of these bodies may be unavailable or locked up as regards immediate needs, to such an extent that the soil is actually less fertile than one containing them in much smaller amounts but presenting them in forms that are easily taken up by plants. This is the reason why a soil showing lack of fertility will often readily respond to small dressings of certain manures. Such a soil is amenable to treatment other than manuring; it requires that the plant food in it shall be made to become available at a greater rate, and good cultivation, draining and liming are partial means to this end.

In this consideration regarding availability of plant food in the soil, it must not be forgotten that methods have been devised with the object of

ascertaining roughly the amount of certain soil constituents ready for direct use by the plant; an example is the determination of the proportion of the phosphates soluble in weak citric acid.

This is useful for obtaining broad indications of what is wanted in certain directions as regards manuring, as well as for comparing soils of the same kind. The serious limitation of such methods is that they do not include a ready means of finding the availability of the chief forms in which nitrogen—the most important of plant food elements—usually exists in soils.

More directly useful results are afforded by the second kind of analysis of soils, under discussion, which is the physical or mechanical analysis. In most cases this gives a means of estimating approximately such matters as the power of the soil to retain water, the ease with which water drains away from it, and its ability to withstand drought; it may even supply indications as to the best methods of cultivation of the soil. Conditions in the tropics nevertheless render the humus content of the soil of such paramount importance regarding its permeability, water capacity and drainage that this factor has to be considered very seriously when interpretation is being given to the results of physical analysis. If this is remembered, these may be used in a most valuable way by the planter and other agriculturists.

A further complication of the matter is that the results of analysis of the chemical and physical conditions of the soil do not enable much to be inferred concerning its biological conditions. These papers have been often employed recently to explain and emphasize the importance of the modern conception of the work of bacteria in the soil. It is here that the physical analysis again shows its usefulness, provided that its results are interpreted in the light of knowledge mainly concerning the water and lime content of the soil, and regarding its aeration. To make the matter plain, it is only necessary to contrast the nitrification and maintained fertility in an open soil, with an efficient water-supply, with the loss of nitrogen and non-productiveness in a waterlogged clay soil.

It can be concluded from these matters that, while their proper employment may be most useful, chemical and physical analyses of the soil—especially the former kind of investigation—are rarely capable by themselves of providing direct conclusions regarding fertility in a particular area. Their main use, in a broad way, is for supplying material in such work as a soil survey, by which the soils of a country may be usefully classified so that general predictions as to the manurial requirements of these may be made. They can never replace the simple field experiment as a means of ascertaining the suitability of a given area of soil for raising any crop that is intended to cultivate on that area.—*The Agricultural News*.

Soil Fertility.

The term "Soil Fertility" cannot be said to have any definite significance, since it can only be employed to denote a relative condition. For instance, a virgin soil with only a very small proportion of available plant food may, through the activity of bacterial life present in it, be highly nitrified and fertile; and yet it will become useless after a couple of crops have been taken off it. An analysis, to be of value, should indicate the total amount of mineral plant food in the soil rather than the measure of fertility which depends, so to speak, on accidental and variable circumstances, and is obtainable without any great difficulty by artificial means.

The hydrochloric acid method of soil analysis is useful in this respect, in that while it gives no true indication of immediate fertility, it is a guide

to the total reserve of plant food which can be made available through a comparatively long space of time.

The difficulty in ascertaining the immediate fertility of a soil is in discovering the solvent which most nearly approaches the action of plant roots. There is present in most soils a certain proportion of plant food that may be said to be ready for root absorption, but the bulk of it awaits the solvent action of the roots.

Different chemical compounds respond differently to a particular solvent agent, and different agents act differently on a particular chemical compound. This is a common experience in the use of re-agents in the laboratory.

The action of carbonic acid and other solvent substances present in soil water is sufficient to bring about the solution of certain compounds, but not of others. The solutions of the former that are found in the soil will be available to plants, but compounds of the latter type demand the action of what is known as the "acid sap" of the roots.

If the exact composition of this acid sap were ascertainable there would be no difficulty in imitating its action in the laboratory and so discovering the so-called "soluble plant food" in the soil.

There is good reason to believe that the acid sap of plants is not of uniform composition, that is to say that it is not of the same character in the case of all plants; and this fact serves to complicate the work of chemical analysis made with the object of ascertaining the proportion of soluble plant food or determining the measure of immediate fertility. The action of strong acid such as hydrochloric acid can in no way be compared to the action of plant roots. A proper soil map should not be based on considerations of immediate fertility, since as already pointed out, many soils may be very fertile for a short time only and then become exhausted. Closely connected with the question of fertility are the mechanical character of soils and the meteorological conditions prevailing in the districts in which they occur; but the element which has the most important bearing on this question is the biological relations that exist in the soil.

These considerations have been forced upon us by a perusal of a valuable paper by Dr. Jensen of the N. S. W. Department of Agriculture. Himself a chemist, the author fearlessly states that though he at one time expressed a belief that chemical analysis of soils would be of direct value to the agriculturist, subsequent research has convinced him that he was wrong. In certain cases an analysis is of help to the expert, but in the generality of cases instead of being a guide to the person who is in quest of a suitable manure for his crop, it is a delusion leading him to useless expenditure. Many soils which are low in lime and potash are really rich soils, and many others which are apparently rich need manure badly.

Soil analysis by the official method while misleading to the layman has, however, this advantage, that when analytical results are considered carefully in conjunction with such matters as depth of soil, mechanical condition, climate, topography, &c., it aids in judging of the potential fertility of soils. But it is only an aid, and it is very often the case that without it an experienced person is able to pronounce an opinion, after a few minutes' inspection and manipulation of the soil, more definite and correct than that expressed after a complete and tedious chemical analysis.—*The Tropical Agriculturist*.

RUBBER.

Use of Ammonia or Carbonate of Soda in Tapping Hevea.

The following digest of a paper by W. Lucas published in the *Bulletin de l'Association des Planters de Caoutchouc*, Vol.IV, p.206, is reproduced from the *Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases* for September.

The quantity of scrap formed by the coagulation of the latex on the trees being considerable, as compared with the quantity of rubber resulting from the coagulation of the latex in the works, the difference in price between these two qualities has led the Author to make various experiments with the object of reducing the quantity of scrap. The same applies to the "lump" or rubber resulting from the partial coagulation of latex in the cups or during transport, a coagulation due to heat and jolting.

The coagulation of the latex being promoted in an acid medium, the question was to keep the latex in a sufficiently alkaline medium to prevent partial coagulation taking place too quickly, whilst avoiding a degree of alkalinity which would too greatly retard the subsequent coagulation at the factory and require the use of too great an excess of acid. After various trials carried out on 150 trees, the Author decided in favour of using the following solution: 30 cc. of ammonia (17% of gaseous ammonia) and 970 cc. of water. Each coolie received 1 litre (1 $\frac{3}{4}$ pint) of this solution per 150 trees, representing an average of 332 incisions. The trees were tapped daily with half-herringbone cuts. The experiments were continued during a month on more than 5,000 trees, one half of which were tapped as usual, that is to say using ordinary water to facilitate the flow of the latex, whilst for the other half, water with ammonia added was employed. Under these conditions the quantity of scrap coming from the trees for which water alone was used was 50% greater than that from the trees for which ammonia was employed. The method of use of the ammoniacal solution is as follows: the coolie is provided with a piece of rotang about 8 in. long and $\frac{1}{2}$ in. in diameter, one end of which he beats so as to crush the fibres and turn it into a sort of brush. With this brush the coolie wets the vertical outlet channel and then makes 1, 2 or 3 incisions according to the tree, so as to have the half-herringbone on his right, if it has been made from left to right, or on his left if made from right to left. He then takes away a part of the liquid with his brush, applies it against the tree, a little above the top of the herringbone, and presses out the liquid with his finger. This is done 2 or 3 times in succession for each such cut. Taking up his position behind the tree, the coolie can very well guide the outflow of the liquid, which follows the flow of latex, without anything dripping on the tree. This entire operation occupied an exceedingly short space of time.

With regard to the lump, it can be reduced by adding 1.6 cc. of ammonia (17% of ammonia gas) per litre of water in the vessels into which the latex flows. The quantity, which was about 240 grams of dry lump for 150 trees, was reduced by one half by the use of the ammoniacal solution on the tree alone and to 3 to 14 gr. when this solution was used on the tree and in the cups.

As regards coagulation, 0.7 cc. of acetic acid (98% strength) was used per litre of diluted latex when ammonia was not employed; under these conditions coagulation began straightway upon the addition of the acetic acid and the coagulum was removed on the expiry of 20 minutes. By using

the ammoniacal solution on the tree alone, the quantity of acetic acid employed was the same as that indicated above, but coagulation took place more slowly and the coagulum was only taken away after 30 minutes. As a consequence of using the ammoniacal solution on the tree and in the cups, the quantity of acetic acid needed was 1.3 cc. per litre of dilute latex and the coagulum was also removed after 3 minutes. From the foregoing it results that scrap and lump are substantially reduced by employing ammonia and that consequently the quantity of rubber prepared in the factory is increased by the same amount. Besides this, as the ammonia retards the formation of scrap (which chokes up the laticiferous vessels and contributes to stopping the flow of latex), it cannot be otherwise than favourable to the yield.

The Author found that ammonia possesses in addition the following advantages :—

1. The straining of the latex is much easier than if water alone is used, in which case the meshes of the strainer are quickly choked up, which necessitates frequent cleaning.

2. The impurities passing through the strainer fall more easily to the bottom of the vessel in which the coagulation is carried out, while they remain in suspension if coagulation has already begun.

In consequence of the comparative high price of ammonia, the author made experiments with carbonate of soda, which gave results just as good, but do not yet allow of indicating figures and must be continued on a basis of comparison with ammonia.

TEA.

There is no doubt that the present tendency of tea companies is to pay more attention to the production of quantity than of quality, and the result of this year's working may open our eyes to the danger of this policy. In this connection the remark of Messrs. McMeekin & Co., in their weekly report reproduced in "Capital" last week, is very much to the point. "It might be well for growers generally to turn their attention more closely to the manufacturing processes and to produce rather less tea of more selective quality."—*Capital*.

The four largest producing countries in the world, India, Ceylon, China, and Java, are increasing their output at an enormous rate every year, and the consuming population, though increasing, is doing so at a slow pace. The upshot will be that in a short time, if the present rate of production is kept up, there will be more tea than there will be a profitable market for. I have even heard it said that there will be more tea than there will be people to drink it, but I can hardly admit that, as there are thousands of people now who would drink more tea than they do if they could only afford it. The result of this great output will be a cheapening of the article to such an extent that it will be unprofitable to grow it, and I have little doubt that some estates are finding that out even now. Another result may be that poor companies will throw up the sponge, and that large producing areas will be abandoned, this allowing supply and demand to again reach the right level. This has happened before, when things were not pushed to the pitch they are to-day, and when it happens again it will mean nothing less than ruin to a considerable part of the industry.—*Capital*.

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DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

Minutes of the General Quarterly Meeting of the Mundakayam Rubber Planters' Association held at Yendayar Bungalow, on November 2nd, 1912, at 10 a.m.

PRESENT.—Messrs. J. R. Vincent (Chairman), G. H. Danvers Davy (Vice-Chairman), V. R. Bates, R. A. Fraser, C. M. Hunnybun, H. M. E. Howson, R. Harley, Ashton Hamond, H. B. Kirk, J. J. Murphy, H. O'Reilly, W. P. Rogers, Malcolm Smith, E. B. Tapsell, A. C. Vincent, and Edwin Vincent (Honorary Secretary). *Visitors*.—Messrs. A. W. L. Vernede, J. A. Richardson, T. C. Forbes, Mackenzie and Standen.

The Chairman at the outset proposed a vote of condolence with the family of the late Mr. Fred. H. Hall, which was passed, all members standing.

The Honorary Secretary also read letters of sympathy from the Malabar Coast Planters' Association and Messrs. Peirce, Leslie & Co.

The Chairman then welcomed the visitors.

Business:—

(1.) *Minutes*.—The minutes of the last meeting were taken as read.

(2.) *Report of the Bangalore Delegate*.—Mr. G. H. Danvers Davy said:—

“Mr. Chairman and Gentlemen,—My representation as delegate, from Mundakayam, except in name was,—I am afraid—a very poor one. I had no resolutions to bring forward and so in most cases voted with the majority.

“Your instructions were carried out to the best of my ability and if any of the subjects specially brought forward by you in your instructions, were not brought up by me, my only excuse is that these headings were far more ably dealt with by other delegates.

“I, as your representative, was in a far happier position than most of the other delegates in South India. Most of them had their own troubles and worries and although discussion on the various subjects will not be found in print, this is owing to the leniency of the Chairman who allowed us

to discuss these matters in Committee for which most of the delegates were heartily grateful—yet they were most exhaustively thrashed out.

“According to your wishes I followed your instructions regarding the following headings on the U. P. A. S. I. agenda.

“No. 7 a. No. 8 and No. 9.—As regards No. 9 I can see no hope of Government ever levying an export duty on Bones. Revenue to the Government from this source alone means a very big sum which it has no desire to lose. Australia and Ceylon have been enormous buyers of bone manure but the former country has now made it prohibitive to import bones. The reason of this is the introduction of foot and mouth disease and many other diseases common to cattle in India and if we can induce Ceylon to look on it in the same light as Australia so much the better for us.

“No. 11. *Tea Cess*.—The question of the renewal of the Cess was gone into, the general opinion was that this Cess should be continued for another five years.

“No. 13. *International Rubber Exhibition*.—As regards the disposal of the funds, the Chairman explained that he had written to the Madras Government desiring them to express their views as to how the money unspent at the London Exhibition of 1911 should be dealt with. The Madras Government in reply expressed their desire to have it refunded. Accordingly the balance of funds given by Madras and Travancore were sent back to the respective donors.

“No. 14. *Labour*.—This subject was discussed most exhaustively. The matter of recruiting and emigration was brought up by Messrs. Dickins and Hamilton and you have all, no doubt, read what they had to say in the Madras papers. The Ceylon papers have taken up the cudgels on behalf of the Ceylon Planters and scorn the idea of crimping by any Ceylon man. A Scheme of Registration was put before the Meeting and a Sub-Committee was appointed to receive the opinions of the various associations with a view to try and harmonize this into a workable scheme. Will they succeed—I trow not.

“This Scheme of Registration has been distributed by our Honorary Secretary and you have all doubtless thoroughly gone into it and will be in a position to express your view this morning, so that our Honorary Secretary may send up a working scheme before the next General Meeting with the idea of improving the labour position.

“As regards non-service of warrants the following scheme was suggested and carried:—

(1.) That any Magistrate issuing warrant to a kangany or maistry should notify the District Superintendent of Police of the district concerned that such a warrant has been issued.

(2.) That all “hand” warrants should also be endorsed by the District Superintendent of Police of the district in which the warrant is to be served or by his Office Manager.

(3.) That on enquiry of a planter as to the status of any particular maistry or kangany the Superintendent of Police for the district in which the maistry or kangany resides shall make enquiries as to the maistry's or kangany's standing and means, and report the same to the planter.”

“With regard to the Scheme of Registration of Labour, mentioned by Mr. Davy in his report, Mr. Richardson said that the Dewan had made a suggestion that a Commission be appointed to enquire into the matter, con-

sisting of members from the ryots, the P. W. D. and the Travancore Planters' Associations. Mr. Harley, speaking on the subject also thought that some workable scheme might be formed. Eventually the Chairman's proposal to form a Labour Committee to discuss what could best be done, was carried."

The Chairman then proposed a hearty vote of thanks to Mr. Davy, and this was seconded by Mr. Harley, Mr. Davy responding.

(3.) *Removal of the Kanjirapalli Court House.*—The recommendations of the Committee were put before the meeting, and Mr. Vernede said a proposal was on foot to have the Camp shed removed and a Court House built on the site, a new Travellers' Bungalow being erected a little further back. The members received this announcement with pleasure.

(4.) *The Scientific Officer Scheme.*—At the request of the Chairman the Honorary Secretary gave a resumé of all that had so far been done in this direction, referring particularly to the resolution passed at Yendayar on 1st July 1911, to the effect that subject to 90% of the acreage agreeing, the necessary agreements should be drawn out. The Hon. Secretary pointed out that rather more than 90% of the acreage in the district had indicated its willingness to participate in the Scheme and that with the increased acreage now under cultivation the cess would be considerably less than was hitherto thought would be the case. The actual figures were for the initial expenses a cess of 10 annas per acre or if only 90% of the acreage is agreeable 11 annas per acre. Annual estimate 9 annas per acre or if only 90% of the acreage is agreeable 10 annas per acre. The election of a Committee then took place, Messrs. G. H. Danvers Davy, R. A. Fraser and H. B. Kirk being returned, the Chairman and Honorary Secretary to be Ex-officio members. Messrs. J. J. Murphy and R. Harley kindly consented to become Trustees of the Fund.

The following resolutions were also passed after some discussion:—

1. "That the Scientific Officer be under the entire charge and control of the Mundakayam Rubber Planters' Association."
2. "That his residence should be at Mundakayam."
3. "That the Travancore Government be asked to contribute towards the cost of the Scheme."
4. "That the limits of the district in which the Scientific Officer shall work, shall be defined."
5. "That the cost of the scheme be met by an acreage basis guaranteed for a term of years on similar lines to the European Doctor Fund."

With regard to the selection of a suitable officer, Mr. J. J. Murphy proposed: "That Mr. K. E. Nicoll and Professor Wallace be asked to select a man." This was carried *nem con*.

Mr. Murphy further supported the Chairman's proposal that the Honorary Secretary be asked to call for subscriptions to be paid by January 15th, 1913. The discussion closed with a vote of thanks to Messrs. Murphy and Harley for consenting to act as Trustees.

(5) *Rubber for the Imperial Institute.*—Messrs. Murphy and Forbes were asked to judge the samples of rubber brought to the meeting by various members.

(6.) *Revision of Rules.*—In presenting the Committee's recommendations with regard to the revision of rules the resolution was first carried

that the old rules, with subsequent alterations and additions be rescinded. Mr. Murphy then proposed that the Committee's recommendations be adopted *in toto* and this was carried unanimously.

(7.) *Election of Auditors.*—Messrs. H. B. Kirk and R. A. Fraser were asked to become for one year, the Auditors of the Association accounts. These gentlemen kindly consented to act in this capacity.

(8.) *Acreage Vote.*—The Chairman proposed that provision be made in the rules with regard to the acreage vote. Mr. H. B. Kirk suggested that each member be allowed one vote for every 50 acres represented by him. Mr. Murphy put forward an amendment that one vote be allowed for 100 acres only, and that fractions of over 50 acres be given a vote but that fractions of less than 50 acres be not counted. This was unanimously carried.

(9.) *Private Membership.*—The Chairman put the suggestion before the meeting that persons who were not members of the Planting Community in Mundakayam should be admitted to membership of the Association on payment of a small fee which would accord them a vote at the meetings. Mr. H. B. Kirk proposed that such members pay Rs. 10 per annum and they be accorded one vote. No dissentients.

(10.) *Sri Mulam.*—Mr. Richardson said he was under the impression that the Peermade and Mundakayam Associations were allowed to send only 1 representative for the two districts, and the Honorary Secretary was asked to write Government as to this. In the event of the Government allowing separate representations, Mr. J. R. Vincent kindly consented, after election, to represent Mundakayam at the popular Assembly. Mr. Vincent was asked to particularly bring up the question of roads.

(11.) *Labour Act of Travancore.*—Mr. J. A. Richardson addressed the meeting with regard to this Act and the Chairman proposed that he be supported by the Association in his representations to Government on the question.—Carried.

(12.) *Postal Delays.*—Mr. H. B. Kirk handed in a letter from the Mundakayam Postmaster in answer to his complaint with regard to delay in delivery of parcels. The Honorary Secretary was asked to approach the Postmaster-General with a view to accelerating the delivery in Mundakayam of postal packets, etc.

(13.) *Correspondence.*—The Hony. Secretary read the following:—

(1.) Letter from and to the Excise Commissioner with regard to Import Duties on Tobacco. No discussion.

(2.) Letter from the British Resident and Mr. F. F. R. V. Hunt with regard to the arrest of Mr. Hamond. The Honorary Secretary was requested to approach Government and ask for proceedings in this case to be accelerated.

(3.) Letters with regard to Mr. Asher's application for repairs to the Lalam-Erutapetta Road and for the establishment of a post and telegraph Office at Erutapetta. The Honorary Secretary said that he was still in correspondence with the parties concerned on these subjects.

(4.) Letter from Mr. Anstead with regard to Fertiliser Analyses. No discussion.

(5.) Letter from the Chief Secretary to Government informing the Association that a license has now been granted to Messrs. S. P. Mel & Co., Mundakayam.

(6.) Letter from the Chief Secretary to Government announcing that only one toll will be levied at the Kanjirappalli Bridge on vehicles returning through the gates within 24 hours. On this subject Mr. J. J. Murphy asked that the Honorary Secretary be requested to approach Government praying for an improved road in view of the tolls paid. Mr. Danvers Davy seconded and the motion carried.

(7.) Letter from Mr. S. C. H. Robinson, with regard to his jurisdiction as an ordinary 1st Class Magistrate and as a Special Magistrate.

(8.) Letter from Mr. Fletcher Norton, Secretary to the U. P. A. S. I., with regard to the annual subscription. Mr. J. J. Murphy proposed that the resolution of January last be adhered to.—Carried.

(9.) *Date and Place of next Meeting.*—Under the new rule this will take place on February 1st, 1913, (Saturday). By kind invitation of Mr. Ashton Hamond the meeting will be held at Chennappa Bungalow.

The meeting terminated with a vote of thanks to the Chair on the proposition of Mr. G. H. Danvers Davy, seconded by Mr. A. C. Vincent.

South Mysore Planters' Association.

Minutes of a Special General Meeting held at the Hanbali Travellers' Bungalow, on November 28th, 1912.

PRESENT.—Messrs. F. M. Hamilton (President), A. R. Park, W. F. Scholfield, C. K. Pittock, E. M. Davidson, D. Jackson, W. L. Crawford, Thiselton Anderson, (Honorary Member), G. N. Frattini, *Visitor*; Mr. Galliffe, Mr. M. J. Woodbridge, Honorary Secretary.

Election of Planting Member of Council Fort St. George.—The rules governing the election having been explained this Association voted unanimously for Mr. E. F. Barber.

Report of Delegate to Mysore Representative Assembly.—Mr. Crawford said that according to his instructions he had thanked the Government for the reduction of the Rubber land assessment and had asked for a similar concession on Coffee land, for those who had bought land held on 30 years tenure from others, and wished to put in on permanent tenure. He had also touched on the subject of the Mangalore Railway and assured the retiring Dewan of the high appreciation on the part of the South Mysore Planters' Association for all he had done for the welfare of Mysore.

U. P. A. Scheme of Registration by means of Finger Prints.—This subject was introduced by the President as follows:—"It has been thought best to put this on the agenda for discussion as although the U. P. A. had asked us individually to criticise the Scheme, I am sure there are many members of this Association who would like to discuss in meeting the different clauses. I hope some members have sent their views in. I am ashamed to say I have not yet done so owing to work. My views are as follows:—

As the Scheme at present does not apply to Local Labour we have to deal with Labour imported from British territory into Mysore.

1. Without an Extradition Act I don't think we can expect the Madras Government to help us in the case of Native territories.

Without Government help in the way of persons before whom advances are given any registration would be inoperative and no Government official would allow an advance of more than a man could pay off in one year.

2. Without some arrangements for settling old balances due by coolies to maistries, our maistries would not agree.

A system of Cooly Registration on Estates would not be a sufficient safeguard as most of the crimping and bolting of coolies takes place before coolies get on to the Estate. So far my views are destructive.

I will propose certain alterations in the Scheme as drawn up :—

1. "That it includes maistries and coolies.

2. That all old advances as proved by maistries, before their coolies be taken as written off $\frac{1}{2}$ to the maistries and $\frac{1}{2}$ to the Estate the coolies join after the Scheme comes into force."

Maistries' advances be written off $\frac{1}{2}$ to themselves $\frac{1}{2}$ to the Estate they join.

In the latter case, of course, Managers would try to get maistries who did not owe much old balances. It might be necessary to get managers to send in a list of all maistries who owed money to the Register Office.

Working of Scheme.—Government be asked to appoint officials before whom advances could be given and finger prints taken in every village of any size, say 50 houses.

Fees.—I would suggest that a fee of 4 as per cooly be fixed for the first year and if insufficient a call be made on each Estate joining, in proportion to the number of coolies employed. That the above fee do cover all expenses of registration, correspondence, &c. It remains for individual members of a District Association to say whether they will or will not join the Scheme as passed by the U. P. A. S. I. by this I mean it is not necessary for any planter to join who does not wish to do so even if a scheme is passed. Of course, your delegates to U. P. A. would have to get instructions as to voting."

A discussion took place and it was decided that—

(1.) It should be clearly stated that the Scheme refers both to maistries and coolies.

(2.) Cooly finger prints must be taken in the presence of persons authorized by Government;

(3.) That the Scheme can only be of use in Mysore in the absence of extradition if *in all cases* finger prints are taken and reference made to the R. O. *before* an advance is given to maistry or cooly.

(4.) In the note to Para III Scheme of Registering by Finger Prints the re-in re-registered seems to be a misprint.

(5.) The Honorary Secretary was instructed to write to the Secretary, U. P. A. that the meeting is of opinion that the Committee appointed by the U. P. A. should, as soon as possible, issue a progress report for discussion by District Associations.

Mr. G. N. Frattini was elected as an Honorary member of the Association.

The Meeting then closed with a vote of thanks to Mr. A. R. Park for his hospitality.

(Signed) M. J. WOODBRIDGE,

Hony. Secretary, S. M. P. A.

Wynaad Planters' Association

*Proceedings of a Special Meeting held at Meppadi Club,
on December 4th, 1912.*

PRESENT.—Messrs. Bownass, Darkin, Gillatt, Macbain, G. C. Parker, J. C. Parker, Powell and C. E. Abbott (Honorary Secretary) Mr. J. C. Parker *in the Chair*.

1811. Read letter requesting the Honorary Secretary to call a special meeting "to consider the question of damaged teas shipped during the monsoon."

1812. After reading letters from the Agents and Secretaries of various estates the following resolution was proposed by Mr. J. C. Parker seconded by Mr T. S. Gillatt and carried.

"It having just been brought to our notice that more than 150,000 lbs. of Wynaad Estate teas arrived in London in a more or less musty condition—the packages being mildewed—this Association is of opinion that the Calicut Coast Agents should be communicated with, and asked to give an explanation as to how this has occurred—seeing that no complaints were received by Superintendents from their Agents when the teas were received in Calicut."

1813. A letter was read from Mr. R. K. Walker expressing his opinion that until the Cochin Harbour Scheme becomes a reality we should combine to induce the South India Railway to materially reduce rates from Calicut to Madras, and arrange for shipment of all our teas during the monsoon months at the latter port as unless something is done insurance will soon become prohibitive if not impossible.

It was resolved: "That the Honorary Secretary address the Traffic Manager, South Indian Railway about this."

1814. *The late Mr. Mackinlay*.—Resolved: "That the Honorary Secretary write to Mrs. Mackinlay assuring her of the deep regret with which the members of this Association have heard of her loss, and of their sympathy with her."

(Signed) J. CARSON PARKER,

Chairman.

(") C. E. ABBOTT,

Honorary Secretary.

Shevaroy Planters' Association.

Proceedings of a Quarterly General Meeting of the S. P. A. held at Victoria Rooms, Yercaud, on December 3rd, 1912.

PRESENT.—Messrs. F. Carey, E. Dickins, R. A. Gilby, P. Goubieât, S. M. Hight, A. P. Kinlock, A. B. Kundaswamy, J. C. Large, W. I. Lechler, C. G. Lechler, T. Manuel, F. Pegge, C. Rahm, W. Rahm, Revd. Rochêt, Revd. Spencer, Messrs. F. D. Short, L. E. T. Short, G. Turner, and Chas. Dickins (Honorary Secretary and Chairman). *Visitor*: Mr. D'Silva.

1. The notice calling the Meeting was taken as read.

2. With reference to Resolution passed at Meeting of 19th September, 1912 *re.* absence of Registrar's Clerk from office on office days. Read and recorded with satisfaction letter dated 30th September, 1912, from the Registrar, Salem District.

3. *Fertiliser Analyses*.—Read and recorded letter dated 23rd September, 1912 from the Planting Expert.

4. *Customs Duty on Coffee, Tea, and Rubber Machinery*.—Read Circular No. 39/12 dated 20th November, from the Secretary, U. P. A. S. I. Resolved: "That this Association do support a movement to have all machinery required for Coffee, Tea, or Rubber work made free of Customs duty."

5. *Election of Planting Member*.—Mr. E. F. Barber was unanimously elected Planting Member.

6. *Mr. Marden's Registration Scheme*.—The Honorary Secretary on introducing the subject to the meeting stated that he had made a mistake in his Annual Report in referring to the Scheme as Mr. Barber's. After a prolonged discussion of the Scheme it was proposed by Mr. W. I. Lechler, seconded by Mr. G. Turner and carried unanimously:—

"That in default of a better scheme, the rough copy before the Meeting be approved, provisionally, and forwarded with the suggestions of this meeting to the Committee appointed by the U. P. A. S. I."

(Signed) CHAS. DICKINS,

Hony. Secy. & Chairman.

PROCESS FOR PRODUCING "CAFFEINE-LESS" COFFEE.

The process of Friederick Meyer, Thornton Heath, Surrey, England, as patented in Germany, consists in putting the coffee into a suitable receptacle, a revolvable drum-sieve, for instance; then, from a reservoir, admitting a proper quantity of totuol, xylol or some other available solvent, and allowing these to act on the coffee while revolving the preforated drum, the solvent in the meantime being raised to boiling temperature by means of a convenient heating device. In a short time the caffeine is so completely extracted from the coffee beans as to be barely quantitatively recognizable. The caffeine solution is then drawn off and the caffeine and solvent weighed separately if desired. The coffee remaining in the sieve cylinder is freed from any remaining solvent by the passage through it of suitably heated air.

—*Neueste Erfindungen und Erfahrungen*.—*The Spice Mill*.

CORRESPONDENCE.

To

The Editor of the *Planters' Chronicle*.

Dear Mr. Editor,—*Did* you see what the Editor of the "Ceylon Times" said in a leading article the other day?—"No one pretends that the conditions of labour and pay that exist in Ceylon are such as would not afford grounds for very damaging attacks by people interested in stemming the tide of immigration into Ceylon from India"—Who'd have thought it! Rather a different tone to the blatantly triumphant note of cocksureness of a few months ago when S. Indian Planters (especially of the Shevaroy variety) were fools, and the Messrs. Goodfellow just too cute for words;

Somebody must have been telling secrets to the *Ceylon Times*, and it's not the first time that candid friends have been mistaken for enemies. The *Ceylon Times* will have lots of opportunities later on of giving vent to its feelings, I wonder whether it will adopt the "alas! too true" tone, or revert to the paroxysmal shrieks of the alarmed jungle hen.—we must wait and see.

Yours faithfully,

(Sd.) AYLMER Ff. MARTIN.

To

The Editor of the *Planters' Chronicle*.**The Nilgiri Coffee Hybridisation Experiment Plot.**

Sir,—I am unable to agree with your correspondent in his criticism of the Coffee Hybridisation Experiment Plot contained in "Nilgiri Notes" in your issue of 30th November.

In June a lengthy correspondence between the Local Committee and myself was published which may have shown some 'want of cohesion' between us at the outset, but I think matters were thrashed out to a satisfactory conclusion. At any rate my original plan of planting and working the plot has been adhered to. That Nilgiri planters do not care what will happen to the plot is an admission I am grieved to hear and one which I trust is not absolutely true.

I must really protest against your correspondent's statement that "no definite scheme of work has been formulated, or at least nothing that anyone knows anything about." The correspondence referred to above contains a formulated plan which is described in detail on page 355 of Vol. VII. This plan has not only been formulated but it has been carried out. Alarmed by your correspondent's criticism I went last week to inspect the plot and found that it had been planted up in accordance with my plan by Mr. Butcher and that it had been inspected by the local Committee. The following plots have been planted, *Arabica*, *Robusta*, *Marigogipe*, *Blue Mountain Arabica*, and *Mocha*, all containing twelve plants each with the exception of the last for which only five plants were available. This will be completed next year however. In addition to this two plots of existing hybrids were planted as long ago as last April, *viz.*, three plants each of the Hon'ble J. G. Hamilton's Hybrid, and the Saklaspur Hybrid (Mr. Crawford's) and two plots of three plants each of Ben Hope Hybrids No. 1 and No. 2.

This I consider to be a good start with material for future work. All the plants are planted 12 x 12 and the only variation of my original plan is that it was found impossible to leave a 24 foot space between each plot, and only 12 feet has been left.

The planting has been carefully done and despite the recent, heavy rain the plants look very healthy. The land is admittedly steep but not more so than very much other land under good Coffee in the Nilgiris.

In my opinion it would be a mistake to raise hybrids under too favoured conditions so that they will be pampered weaklings unable to thrive under estate conditions. The object is rather to grow them under such hard conditions that if they will grow in the Experiment Plot they will grow anywhere.

While on the subject I might take the opportunity to explain that the original correspondence between the local Committee and myself arose because they wished to adopt a process of *selection* while I had in view *hybridisation* to arrive at a disease resistant coffee plant. These two are different processes and while I agree that much good can be done by selection only, if the ideal result was obtained it would be a coffee plant resistant to the attack of Green Bug but still *arabica*, while if the ideal result of hybridisation is obtained it will be a coffee plant not only disease resistant but a new variety with improved vigour, yield, and possibly quality. In my opinion, *arabica* is not the best variety of coffee to grow and the object of my Experiment Plot was to obtain a better. I may say that the idea of selection work and isolated plants to be grown in the Ooty Gardens has been abandoned by the local Committee.

In conclusion, though your correspondent's experts may disagree, one at least is satisfied with the start which has been made and looks forward with confidence to the justification of the existence of the Experiment Plot.

Yours faithfully,

RUDOLPH D. ANSTEAD,

Planting Expert.

The Acting Chief Secretary to the Government of Madras writes under date Fort St. George, the 27th November 1912 as follows :—

To

The Chairman, U. P. A. S. I.

Sir,—I am directed to inform you that intimation has been received from the Government of India that the Royal Public Service Commission will assemble in Madras about the end of December and that its sittings for the taking of evidence will commence on Wednesday the 8th January, 1913. For the assistance of witnesses the Commission has under preparation in England a set of preliminary questions which is expected to reach India shortly, but the Government are not yet aware how many witnesses the Commission will be able to examine while the selection of witnesses for examination will be made by the Commission itself. I am to ask whether the Planters' Association would be prepared to nominate one or more persons for examination before the Commission and in the event of the answer being in the affirmative I am to ask that the names of those so nominated may be intimated to me. As soon as the further instructions of the Commission have been received by this Government, a further communication will then be made to you.

I have the honour to be,

Sir,

Your Most Obedient Servant,

(Sd.) A. G. CARDEW,

Ag. Chief Secretary.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Holes in Coffee Soil : - Last March the Scientific Officer paid a visit to Coorg by special request to examine a number of holes which appeared in the soil in very large numbers. A certain amount of mystery attaches to these holes, for no insect could be found associated with them at the time and many theories have been put forward to account for their presence. It is, however, becoming more and more certain that they were made by the emergence of a Cicada which appeared in large numbers in the district at the beginning of this year. The Government Entomologist, who was in Coorg recently, gave it as his opinion that the holes were caused by a Cicada, and he has kindly forwarded the following extract on periodical Cicada which appeared in the Entomological Section of the *Connecticut Experiment Station Report* for 1911.

"Some six or seven weeks after the eggs are laid in the twigs the young cicadas hatch from them, drop to the ground, and work their way into it, going twelve or eighteen inches beneath the surface. Here they live a subterranean life for seventeen years, where it is difficult to follow their movements and development. Yet this has been done in three or four cases by the Bureau of Entomology, and it was found that the larvae moulted four times, the fourth moult usually occurring about the tenth year. They burrow chiefly with their forelegs, suck the juices from the small roots from one-eighth to three-sixteenths of an inch in diameter, and upon such food they subsist for the full period of seventeen years, when *the pupae crawl out of the ground, leaving round exit holes about three-eighths of an inch in diameter. Sometimes these holes are very close together, and in several instances came out of the middle of a private road, where the ground was very hard and solid.* Earlier records of Brood II show that in some cases the pupae make cones, or huts, by raising the soil up around their burrows to a height of two or three inches. None of these were observed in Connecticut in 1911."

It is doubtful whether the actual presence of the holes in the soil does much damage, but the root feeding habits of the Cicada larvae, when they are in large numbers, might do a considerable amount of harm. The presence of the larvae of the cockchafer in considerable numbers in the soil in Coorg must also have a deleterious effect upon the coffee trees especially on young supplies. The Government Entomologist informs me that he caught a number of other insects when in Coorg the larvae of which are root-feeders. It is difficult to suggest a practical remedy on a large scale for these pests, but recent work with apterite in connection with the Mealy Bug Scale has proved so successful that it is probable that it will have a beneficial effect in the case of other root feeding pests. The Government Entomologist suggests the use of Tobacco waste which could be obtained from the factories at Trichinopoly and later on possibly from the factory which is being built at Bangalore. This waste should be put in a shallow trench opened about a foot away from the plant and about eight inches wide at the rate of one or two pounds per tree and covered over with soil. Our thanks are due to the Government Entomologist for the interest he has taken in the matter and the information he has so kindly forwarded.

It is hoped to publish an article describing the use of apterite and the results obtained with it on coffee estates in Coorg, at an early date.

R. D. A.

SOILS.

Secondary Actions of Manures.

BY A. D. HALL, M. A. F. R. S.,

Director of Rothamsted Experimental Station.

The practical man uses the word exhausted not in its strict sense, but as signifying any conditions of the soil which lowers its crop producing capacity. For example, wheat is spoken of as an exhausting crop, although it takes out of the land only about a third of the plant food that is removed by a crop of roots. But because wheat occupies the land for the greater part of the year, during which time no inter-tillage can be carried on, the soil loses its texture and falls off in its mechanical condition. The lack of cultivation may also interfere with the availability of the stores of plant food. At any rate, the land after a wheat crop is less productive, because of its lack of condition and not from any absolute poverty. For the same kind of reason then, nitrate of soda gets described as an exhausting manure, not because it robs the land in any special way, but simply because it sets up a bad texture of the soil which so easily leads to an inferior yield in the following crop.

The list of secondary interactions between fertiliser and soil which may have a potent influence on the value of the fertiliser in practice is not ended with the changes set up by nitrate of soda and sulphate of ammonia; there is plenty of practical evidence that the effect of applying potash salts such as kainit, muriate or sulphate of potash, is not wholly comprised in the provision of a certain amount of potash for the nutriment of the crop. In the first place it has often been remarked by those concerned with field experiments that cases occur when the addition of potash salts to a mixture so far from increasing the return actually reduces it. As a rule these results have been set down to the large experimental error which is inevitable in all field trials, but so convinced have been some experimenters of the reality of the effect that they have begun to speak of the "depressing effect of potash" upon the crop.

From the point of view of nutrition alone such a depressing effect is impossible; in some way the effect must be special to the soil and due to an unsuspected interaction between soil and potash fertiliser. A clue to the sort of action to be looked for may be found in the observations which have been recorded in some of the cases where the use of potash had resulted in a lowered yield, that the ground remains a little wetter after the application of kainit or other potash salts. As in the case of nitrate of soda, this apparent wetness has been set down to the water absorbing properties of potash salts, which are chiefly due to the magnesium chloride which is always present in them, but the small amount of water which is absorbable by an ordinary dressing of potash salts would be inappreciable when diffused through the soil.

The carbonate of lime in the soil next suggested itself as a possible reacting substance, and a series of experiments have shown that when weak solution of potash salts remain in contact with carbonate of lime a small quantity of free carbonate of potash is produced. The figures showing the extent of the reaction have not, as yet, been published, but the action is one of those cases where the amount of chemical change that is set up depends upon the relative quantities of the reacting bodies, so that in the soil where the carbonate of lime would generally be in great excess the proportion of

the potash salts that could be converted into carbonate would be comparatively large. The investigation involves some further considerations of the part played by carbon dioxide, which is also present in the soil; and also of the results of partial washing of the soil as by rain; but the central fact has been established that soluble potash salts and carbonate of lime will react so as to produce carbonate of potash, which, like other alkalis, will bring about deflocculation of the clay.

All the effects of fertilisers upon soil which have been discussed are due to chemical changes of a comparatively minor order which were overlooked or not suspected when fertiliser actions first began to be studied, because in most cases the agent in the process is that part of the substance which possess no value as a fertiliser. For example, sulphate of ammonia was considered as a source of nitrogen only; the sulphuric acid it contained was entirely ignored and regarded as of no account. Similarly with nitrate of soda the nitrogen is the important part upon which its value as a fertiliser depends the mistake came in supposing that the soda was entirely without effect. The same state of affairs has occurred in the history of science. These second approximations, which may become large enough to override the main truth, often make themselves evident to the practical man, who delights in them as proofs that theory and practice do not always square, though theory can never be more than a method of explaining, and in its turn predicting the practice.

Among the results, some definite conclusions are that the long continued use of sulphate of ammonia on soils poor in lime results in the soils becoming acid. The acidity is caused by certain microfungi in the soil which split up the sulphate of ammonia in order to obtain the ammonia, and thereby set free sulphuric acid. The infertility of such soils is due to the way all the regular bacterial changes in the soil are suspended by the acidity; instead, fungi permeate the soil and seize upon the manure. The remedy, as may be seen upon the Woburn plots, is the use of sufficient lime to keep the soil neutral. From the Rothamsted soils carbonate of lime is being washed out at the rate of 800 to 1,000 lbs. per acre per annum, the losses being increased by the use of sulphate of ammonia, but lessened by farmyard manure or nitrate of soda. Nitrate of soda, when applied to heavy soils in large quantities, destroys their texture. Some of the nitrate of soda gets converted into carbonate of soda by the action of plants and bacteria, and carbonate of soda, by deflocculating the clay particles, destroys the tilth. The best remedies are the use of soot or superphosphates; the best preventive is the use of a mixture of nitrate of soda and sulphate of ammonia instead of either separately.—*Indian Planters' Gazette*.

RUBBER Seeds.

We learn that a good deal of interest has lately been evinced in regard to Hevea seeds for milling purposes, and there has been some enquiry going on regarding cost of collection. For making cattle food, and for other purposes the seeds, which now carpet the ground beneath the trees and are trodden on and otherwise destroyed, ought to bring in some revenue, however, small. If some reliable data can be framed as to quantity obtainable and cost of collection we feel sure a new industry either in the oil extracted, or cake made from it, will spring up, and may be of some benefit to the rubber industry when prices drop.—*Grenier's Rubber News*.

SISAL HEMP

Interest is being taken in Sisal Hemp cultivation and manufacture in at least one district in Southern India, and the following article by Mr. H. T. Macmillan which appeared in *The Tropical Agriculturalist* for November may therefore be of interest.

"With the gradual but constant demand for a supply of good commercial vegetable fibres, whether for textile, ropes, cordage or other purposes, there would seem to be a promising future for so valuable a fibre plant as the Sisal Hemp (*Agave rigida* var. *sislana*.) This plant furnishes the commercial and well-known Sisal hemp from its leaves, and has been in recent years somewhat extensively cultivated in South America, Hawaii, as well as in British, German and Portuguese East Africa. It bears long thick, succulent leaves, 4 to 6 feet in length, usually smooth-edged and ending with a terminal spine. The flowering or "poling" (from the fact that the inflorescence is produced on a long upright pole, 10 to 12 feet in height, which springs from the heart of the plant) takes place when the plant is about 7 to 8 years old. "Poling" affects the quality of fibre; therefore in order to preserve the latter the "pole" should be cut at about 3 feet from the ground, all ground suckers being also removed for the same purpose. If desired for propagation, however, the flowering pole should be allowed to grow, when on an average it will produce from 2,000 to 3,000 bulbils. The latter are an interesting provision of nature, since the plant produces no seed.

"When collecting the leaves for fibre the lower and older ones are taken first. This usually takes place in the third or fourth year from planting, when, under favourable conditions, an average of 25 leaves per annum may be obtained from each plant. Subsequent cuttings may be made at intervals of about six months until the plants should have furnished a total average of about 250 leaves. The plants then cease to be productive, and the ground should be cleared and replanted. It is, however, stated by some planters that a plantation may be maintained in a remunerative condition by merely removing the stumps of the old exhausted plants and thinning out the suckers to the requisite number, but this method is not considered satisfactory.

"With regard to yield, an experimental plantation formed in the Madras Presidency, (on a poor, red, gravelly soil,) with a rainfall of 23 inches, and concluded in 1911, is officially reported to have given an average yield of $3\frac{1}{2}$ per cent. of fibre, the total return per acre (for 900 plants) being about 300 lbs. Sir Daniel Morris, however, estimated a return of 60 lbs. from 1,000 plants, while as much as 800 lbs. per acre has been recorded in an American report on Sisal hemp in Hawaii.

"The plant will thrive in either a dry or moderately wet climate and is not exacting as to soil, though the best returns are produced on good loamy land. It may be said that soil which would be too poor or dry for most other crops would suit the Sisal hemp plant. On average soils the suckers or bulbils may be planted at distance of 8 feet by 5 feet giving 1,089 plants to the acre. In the Madras plantation above referred to plants were spaced at 8 feet by 6 feet apart, that is at the rate of 900 plants to the acre."

In selecting land for Sisal or any Fibre cultivation, the chief object to be held in view should be the close proximity of water, for retting purposes. Machinery of the newest type available should be erected as close as possible to avoid expense of transit and overhandling both of which reduce profits.

The Planters' Chronicle.

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Scientific Officer's Papers.

CXII.—FUMIGATION OF PLANTS IN BANGALORE.

At the last Annual Meeting of the U. P. A. S. I., Mr. N. G. B. Kirwan, the Delegate representing the Bababudins, said that the point that he had been asked to bring up was the prevalence of Pulney Bug in the gardens of the local florists in Bangalore, and he believed, too, in the Lal-Bagh. The case had occurred of a planter buying some orange trees and planting them on his estates and a few months after Pulney Bugs were found on the trees. Mr. Krumbiegel had been advertising for sale fruit trees from Australia, which many planters would like to buy if it were not for the fact that there was Pulney Bug in Bangalore. Could not some arrangement be made, he asked, by which the Scientific Department could look into the matter and stop the sale of such plants. It was a great danger to planters.

I said that I thought it would be better not to pass a resolution but to leave it to the Scientific Department of the U. P. A. S. I. to see what they could do, and this procedure was agreed to after one or two delegates had emphasised the urgency of the matter.

Accordingly, after having a personal interview with Mr. G. H. Krumbiegel, the Economic Botanist for the Government of Mysore, and finding him in sympathy with our views I wrote him as follows on 12th September:—

“In view of the fact that the scale insect, *Lecanium viride*, which was introduced into the Nilgiri Hills some years ago, has done an immense amount of damage to the coffee there, so much in fact as to have killed large acres of it and cause this cultivation in many places to become unprofitable and lead to its abandonment, it is of the utmost importance to guard against a similar introduction of this pest into the coffee growing districts in the Mysore State where it has not yet made its appearance.

“That there is a distinct danger of its introduction is shown by the fact that the scale is present in Bangalore and that only last year it was actually introduced into the Mudigere District on some Citrus plants taken from Bangalore to an estate garden. Fortunately the pest was recognised in time and the outbreak stamped out.

“A large number of ornamental and economic plants are annually sent from Bangalore to planting districts in the Mysore State and elsewhere, and I think you will agree with me that some decided steps should be taken to prevent the spread of scale insects and other diseases through this channel. Legislation on the subject is undoubtedly needed but the time is not yet ripe for it.

“Referring to our conversation on the subject of 27th August, I beg to suggest to you that the Lal-Bagh Gardens should lead the way by fumigating all plants sent out from their nurseries, &c., to planting districts, and thus ensure that at least one centre of distribution supplies disease free plants as far as insect pests are concerned.

“Fumigation is adopted in a large number of agricultural countries and I speak from experience when I say that it is cheap, easy, and effective

A fumigating chamber is required, built away from other buildings and I have found that one built of cement with inside measurements 10 foot cube is a useful size. If this is fitted with moveable lattice work shelves it will hold a large number of small plants while, when the shelves are removed, it will hold a fair number of large plants like crotons and mangos. The door must be made with a wide flange, packed so as to ensure tightness when it is closed.

"I feel sure that if such a practice were adopted at the Lal-Bagh it would have a most beneficial educative effect. Not only would the planters know that they could be sure of getting plants free from scale, but by giving demonstrations, through the medium of the recently formed Horticultural Society, the process could be popularised and the local horticulturalists gradually encouraged to adopt similar precautions. When they actually saw that the process was cheap and easy they would be willing to adopt it probably, especially in competition with the Lal-Bagh nurseries.

"The process of fumigation does no harm whatever to even the most delicate plants provided that the foliage is dry at the time when they are exposed to the Hydrocyanic acid gas.

"I sincerely hope you will be able to see your way to develop this suggestion of mine and I await with great interest your views on the subject. I need hardly say that I shall be at all times only too ready to afford any information or help in my power in fitting up a chamber and carrying out the process."

On the 4th December I received the following letter from Mr. Krumbiegel :—

"In reply to your letter No. 678 dated 12th September, 1912 on the subject of Fumigation of Plants, I beg to state that I am, as already verbally mentioned to you, fully in agreement with the suggestions made by you.

"We have now erected in the Lal-Bagh a Fumigating Chamber and all plants and, if necessary, seeds, coming in from other places as well as all that are being sent out to the districts will be in future fumigated. I shall also send a notification to the local nurserymen and members of the Horticultural Society and of private gardeners, asking them to avail themselves of this fumigating installation. I shall be glad to fumigate for them any plants at the actual cost price of the chemicals only. I shall esteem it a favour if you can make it convenient to come and see the arrangements made and will be glad of any further advice you may have to offer on the working of it."

I have inspected the Fumigatorium which has been erected at the Lal-Bagh and I find that all arrangements have been made for the proper treatment of plants, cuttings, &c sent away from these gardens and in future it will be quite safe for planters to obtain plants from the Lal-Bagh. This does not as yet apply to other gardens in Bangalore, but an effort will be made, through the medium of the Horticultural Society, by means of lectures and demonstrations, to persuade Bangalore horticulturalists to understand the necessity for fumigation and to establish fumigating chambers of their own, and guarantee that plants sent out by them are free from insect pests and have been treated.

This will lead in time to the adoption of similar methods of treatment to free plants from fungoid diseases.

I think it will be agreed that an excellent start has been made and that we should congratulate Mr. Krumbiegel on his forward policy and thank him for so promptly meeting our wishes.

RUDOLPH D. ANSTEAD, *Planting Expert.*

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

A Caterpillar Pest of Tea.—Specimens of a caterpillar which is attacking Tea in the Nilgiri-Wynaad District were recently forwarded by Mr. J. S. Nicolls. The Caterpillar is probably *Heterusia cingala* though at present no perfect insects have been bred out to make certain of the determination. Watt and Mann in their book on *The Pests and Blights of the Tea Plant* recommend the following remedies for this pest :—

“The caterpillars should be collected and destroyed whenever seen, together with cocoons and even more especially the moths, which are brilliant and easily seen, and all the dead leaves should be swept up from below the bushes and burned. The caterpillars are fortunately subject to the attacks of a parasitic fly (*Exerista heterusiae*. Coquillett). This fly fastens its eggs upon the back of the caterpillars the young maggots penetrate the body of their host and feed on its contents, taking care not to touch any vital spot until they are ready to undergo their own transformations. The diseased caterpillar has usually sufficient strength to spin its cocoon, but collapses without turning into a chrysalis. The sudden disappearance of this pest, after reaching its climax, is usually due to the work of this useful parasite, though sometimes a bacterial disease is still more effectual in the work of extermination.”

Mr. Nicolls writes of it, “One of my fields has been attacked with a lot of these and I have twenty coolies picking them off and destroying them. They seem to attack only the old leaf and not the young ones.” Writing on the 5th of December, Mr. Nicolls says, ‘I must have collected over 30,000 slugs now and the total goes on increasing. I pay 2 annas per hundred for them at present to get coolies keen to go out after work and look for them. There is no doubt that they can do harm and I should advise your calling South Indian Planters’ attention to my having come across the beast in very large quantities. I have not looked for parasitic fly attacks.” The latter point is important and a number of cocoons should be collected and placed in a glass jam pot with the mouth covered with fine muslin to see if any flies can be bred out.

Writing again on 11th December, Mr. Nicolls says that he has now collected 146,000 caterpillars. He continues, “After turning to the chrysalis stage the dead leaf with the chrysalis falls off and lodges in amongst the lower branches of the tree, or falls on the ground. I have found them all over the estate now, in some places in scattered patches and close to the boundary of other estates who so far report no signs of the slug. Without they were in quantities you might easily pass them by as they are invariably amongst the old leaves, but you might be struck by the apparent leafless state of the lower branches of a tree after a bad attack. If the slug had gone into the cocoon stage the cocoons might be amongst the dead leaves on the ground.”

Mr. Nicolls reports that he thinks he has found a parasite, as he has got a cocoon full of small maggots. This is being kept under observation. He asks whether if all the leaves and twigs after pruning were buried it would kill the pest or whether the moths would still be able to emerge. If properly buried it would kill all the moths which on emergence from the cocoons would not be able to work their way through the soil; but the safer plan would be to sweep up all prunings and dead leaves, &c., quite clean and burn them.

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore Planters' Association.

Proceedings of the Quarterly General Meeting, held at Balchonnur, on December 2nd, 1912.

PRESENT.—Messrs. C. H. Browne, C. Danvers, C. S. Crawford, A. F. Evetts, H. G. Bonner, Thos. Hunt. (President), W. H. Reed (Honorary Secretary). *By Proxy.*—Mr. S. L. Mathias. *Visitor.*—Mr. J. Grant.

Re-arrangement of Subscription to Assistant Scientific Officer Fund:—Resolved—"That this Association is agreeable to raise the rate of subscription to the U. P. A. S. I. to 2 annas, provided the S. M. P. A. and B. P. A. are prepared to re-arrange their guarantee to the Asst. Scientific Officer Fund, so that all three Associations be on an equal basis."—*Carried.*

Registration Scheme.—After some discussion the Scheme was generally approved of.

Soil Analyses.—About 30 samples were promised at the meeting, other members were to be circularised.

Resignation of Representative on London Chamber of Commerce.—Read Circular No. 40/12 dated 25th November 1912 from the Secretary, U. P. A. S. I.—Resolved—"That Mr. Grant, of Messrs. H. Allan & Co., be asked to act as representative on the Chamber of Commerce, London; should Mr. Grant be unable to act, that Mr. Owen, of Messrs. Sanderson & Co., be asked to represent the U. P. A. S. I."—*Carried.*

Election of Planting Member.—Mr. E. F. Barber was unanimously elected.

Roads. General complaints were made regarding the bad state of the following roads—(1) Chikmagalur—Kadur, (2) Magundi—Kalasa, (3) Magundi—Balur, (4) Kottigahara—Kalasa (between 5th and 8th Mile). Resolved—"That the Honorary Secretary do write to the Mysore Government drawing their attention to the neglected state of the above roads."

(Signed) W. H. REED,

Hony. Secy. & Chairman.

PLANTING MEMBER OF COUNCIL.

The election of a representative of the Planting Community to the Legislative Council of Fort St. George has taken place and Mr. E. F. Barber of Ootacamund has been elected by the United Planters' Association of Southern India to represent it. The Chief Secretary to the Government of Madras, Legislative Department, has been notified of the fact and the election will appear in due course in the Fort St. George Gazette.

REGISTERED ADDRESS OF THE SECRETARY, U. P. A. S. I.

The Members of the United Planters' Association who have occasion to telegraph to the Secretary, U. P. A. S. I. are reminded that his registered address is "Planting" Bangalore.

THE PLANTERS' LIBRARY.**Soil Conditions and Plant Growth by Dr. Russell.**

No one, with reason, could require a commander on active service to employ the intervals between his engagements in writing a history of the campaign. All that is expected is that he should despatch reports from time to time showing the progress which his army is making. Later on, when peace broods again over the land, the historian will tell the story and apportion praise and blame with the cold and cruel justice of the student. So, also, whilst the arduous work of building up a science is in progress, it is not reasonable to expect anyone engaged in that service to write a finished and final account of the operations which are bringing the campaign slowly to a successful issue.

Hence, in taking up Dr. Russell's new volume on "Soil Conditions and Plant Growth," though we may expect it to contain luminous reports of the progress of the army of biochemists in their work, we must not look for a finished story nor for final statements. We shall be content if we learn from headquarters that the operations are proceeding smoothly, and that steady advance is being made.

Looked at from this standpoint, there can be no doubt that Dr. Russell's monograph is eminently successful. It shows that he and his fellow-workers in the Old and New World are beginning to evoke scientific order out of the chaos of observed facts.

No horticulturist requires to be reminded that the soil is a material of extreme complexity, that it is the seat of complex chemical operations, and that it is the natural home of vast numbers of micro-organisms all drawing nourishment therefrom and adding waste substances thereto. Hence it is not necessary to emphasise the difficulty which attaches to investigation into the science of the soil and the crops which it bears. What is worth while perhaps is to note that the agricultural chemist has also, and at last, realised the complexity of the problems presented by the soil. In consequence of his having learned this lesson, agricultural chemistry is passing through a transition stage.

Gone is the curt confidence which marked its earlier manner. It no longer attempts to apply off-hand the chemistry of the laboratory to the field. It recognises that the chemistry of the soil is not that of dead things only, but is the chemistry of the living, of the dying, and of the dead. So profound has been the effect of this discovery, that agricultural chemistry has joined hands with biology, and has even gone so far as to change its name. It is now a branch of the great science of biochemistry.

Though changed in name, its purpose is still the same—a high and splendid purpose though vastly difficult of achievement. That purpose is no less than to discover the laws which lie at the foundation of all good practice.

In its early, confident days, agricultural science sought to accomplish this object by seeking in the plant or soil for the "Principle of Vegetation." Successive pioneers announced, in the not-uncertain tones which science is apt to use, their several discoveries. Van Helmont, who grew a Willow twig in water in a pot of earth, found that in the course of five years it had gained several hundreds of pounds in weight, though the earth in the pot weighed only 2 ounces less at the end of the experiment than at the beginning. Hence he was able, by neglecting the 2 ounces of lost soil, to proclaim that in water he had discovered the principle of vegetation. Another 17th century agricultural chemist, Glauber, announced that saltpetre constitutes this

principle. Others preferred the claims of humus, and Jethro Tull, the great Oxford husbandman, insisted that the particles of soil themselves, if only small enough, were the principles; that the roots of plants had mouths—albeit very little ones—and the end of all good practice was to prepare the plant's pabulum by breaking up the soil as finely as possible. Thus, through many vicissitudes of speculation, agricultural chemistry toiled after agricultural practice—which had had a start of countless centuries—intent on explaining to the grower the mysteries of the soil and its relation with the plant. The slow growth of this scientific knowledge is traced in detail by Dr. Russell in an admirable introductory chapter to which the curious reader may be referred. This youthful, sanguine phase of agricultural chemistry endured even until our own times, for we ourselves have known chemists who thought that to present a soil analysis to an inquirer was to solve his problems as to soil treatment. That phase, however, is over, and Dr. Russell's work marks the second transitional phase between the simple naivete of ignorance and the simple certainty of assured knowledge.

This being the state of the science—so many scattered pieces of fact awaiting the fitting together—it is no disparagement of Dr. Russell's work to say that it fails to complete the picture. Nevertheless, by assembling the scattered pieces of the soil puzzle, and by showing that they are susceptible of association into a finished whole, the author has made a noteworthy contribution to the progress of the science. It is apparent, from what has been said already, that Dr. Russell's work must be studied piece by piece, section by section, rather than as a whole.

Studied in this way the work will prove of great assistance, not only to the agricultural chemist, but also to the gardener. To the latter it will prove by no means easy reading, and this because the narrative is, perforce interrupted at every stage by the introduction of the evidence in support of the statements of the narrative. Far from suggesting that this is a defect, we hold that it is such a merit as to make the volume specially to be commended to the young gardener. For not only is it full of useful information, but it offers exercises—of which many of us stand in need—in the estimation of the value of evidence. The ordinary text book tells you facts, but Dr. Russell's monograph adopts the harder, wiser method of giving you the evidence for the facts.

To give but one illustration, namely, that which deals with the influence of water supply on the effectiveness of manures; every gardener knows in a general way that if a plant receives insufficient water it is unable to derive full profit from manure. But the evidence which Dr. Russell offers shows this in striking and exact measure. Thus, if soils containing different amounts of water are treated with small doses of nitrogenous manure, the plant in the drier soil is not able to make any use of the manure; that in the somewhat moisture soil is able to use the first dose, but gets no advantage from the second; whereas the plant in the well-moistened soil is able to use with advantage all the nitrogen supplied.

We have cited the example, not so much because of its intrinsic importance, but because we know that many a young gardener learns but slowly and with difficulty the art of using artificial manures. A failure or two, due to an insufficiently considered use of this or that artificial manure, is apt to bring him into the ranks of the "disbelievers in artificials," whereas if he will but devote himself to mastering the essential facts and to realising the complexity of relations which obtain between plants and the soil, he will discover that the discriminating use of artificials is one of the secrets of successful practice.—*The Gardeners' Chronicle*

LABOUR IN INDIA.

The labour question in india is one of the most difficult to tackle, especially the matter of crimping. Opinion is more or less divided, and the want of unanimity makes the case more difficult. The Government of India is consequently at a loss to come to any definite decision, and awaits for the problem to ultimately solve itself. There is every probability of gardens, except a few more favoured ones, being short of labourers this year, unless arrangements can be made for local labour, which in some cases is impossible. The outlook in fact is not promising, except in the case of favoured gardens. This means, nothing more nor less, than a shortage in production next season, if we read the signs of the times correct. Contemplated extensions will have to be curtailed, and even more favoured estates, if they go in for intensive cultivation, will have to cut their coat according to their cloth. The labour problem is the one thing that will keep in check the production of Indian tea in the future. The scarcity of labour is, however, being felt in other countries, and is conducing to a shortage rather than an increase in production in future years until the labour difficulty is solved. If consumption increases it will mean a rise in prices again, and then the contemplated 1s. canister will again disappear, giving place to the 1s. 4d. canister at present in vogue. India, we think, will always hold the premier place, and it will lie with the producers to decide whether it will pay them best to go in for quality rather than quantity. Poor Indian teas are a drug on the market at present, but are doing useful service in extending the consumption, they being preferred to other countries for use in blends. Their present cheapness favours their reception. So it is perhaps not an unmixed blessing that is happening to the Indian tea industry. Rich quality teas will always realise high prices, and those gardens noted for will do well to stick to them, as it will pay them well. Our advice for next season, is for these gardens which can produce quality, not to attempt quantity, leaving it to the poorer gardens to supply the deficiency. This will avoid a slump in the market and enable both parties to make a profit. Gardens that can turn out really decent teas should not compete with less favoured ones to their disadvantage. It is a case of "live and let live." The Indian tea industry, as we showed in our last issue, is not at present in a favourable statistical position, as shown by the Board of Trade Returns. It therefore behoves the bosses to consider the status and make such amendments as are necessary. If they will consider the position, and act accordingly, there is every hope that the Indian tea industry will never be swamped by outside competitors. But there is danger in neglecting the warning. The present policy of deluging the markets, both locally and in London, with inferior teas, which cannot pass muster, is suicidal in the extreme. Need we say more on the point? Surely the Directors and Managing Agents of Companies have had their eyes opened to existing facts. We can only hope that the mistakes of this season will not be repeated next year. The planting community may say what they like, but the final verdict as to the quality of the teas lies with the tea tasters in London and Calcutta, and there is no gainsaying their decision. It lies with them, and they are fully qualified to state their pronouncements, which cannot be disputed.

The Labour question in Ceylon is still unsolved. The *Times of Ceylon*, in a notable article in its issue of the 26th November 1912, states the case clearly and shows up the position in its true light. It writes:—"It is pretended by some sagacious people that if only the newspapers kept per-

fectly quiet for a time the labour question in Ceylon would speedily be settled. Other less optimistic souls are always predicting all sorts of dire calamities resulting from the trade secrets that are given away by irresponsible anonymous letter writers in our columns. These writers, it may be mentioned, are never irresponsible, but are usually people well known to ourselves who at least have the opportunity of being well informed on the subject with which they are dealing, but upon whom the yoke of anonymity is imposed by the probability that those in authority over them who have less opportunity of studying the subject would disapprove of their views. Well, never have those who believe in the cult of silence had a finer opportunity of working out the salvation of the planting community of Ceylon. For more than six months the labour question has had an almost complete rest in our columns, and it has moreover, in its general aspects been left entirely alone by most, if not all, District Planters' Associations. We should be glad to learn that the labour question has benefited by this prolonged holiday; but we fear that such is not the case. It is true that labour is coming in better than it was, but that is due, not to any change in the conditions under which labour is employed, but partly to climatic factors on the Coast and partly to the much greater efficiency of the Labour Agency under its new chief. Advances are not going down, but going up; there is an enormous amount of local recruiting in progress; and the coolie is still getting deeper and deeper into the mire of indebtedness. It will be remembered that last January the Planters' Association arrived at a number of momentous decisions, which, if carried out, we think few people will dispute, would remedy the present barbaric conditions under which the Tamil coolie earns his daily bread in this Island, and place Ceylon in a position of equality with the Federated Malay States in the competition for labour. The matter was taken up as strenuously as it was at the time because of the urgent necessity of the planters 'putting their house in order' before the Mannar railway is opened. However, the old bogey of legislation, which has frightened to death so many efforts at reform in Ceylon, once more interposed. As the result of the visit of a Commission to South India resolutions were passed by the Planters' Association which required the force of a legislative enactment in order to be of any utility. The principle of legislation had already been approved by the home proprietors as represented by the Tea and Produce Committee in London, so that one of the most serious obstacles had already been removed. By the time, however, the time had come for the Joint Committee, consisting of planters and Colombo agents, to place the matter before the Attorney-General the anti-legislation forces had had time, time to recover; the Committee appointed never approached the Attorney-General because the Mercantile Members refused to join it, and the lengthy meeting at Kandy, proved purely a wasted effort. Some sort of a compromise was arrived at, this being that an effort would be made to raise the membership of the Labour Federation from fifty to eighty per cent., which it was thought would place it in a position practically to give the same force to resolutions such as those passed at Kandy as if they were made the law of the land. Eight months have elapsed since then, and the Labour Federation appears to be as far off as ever from this commanding position which it sought to secure. The day of the opening of the 'land route' to Ceylon is now close at hand, and there is no hope of the situation being cleared by the time it arrives. The impetus that will be given to immigration by the opening of the railway will be counter-acted by the increasing unpopularity which the Island has gained, as was early shown by Messrs. Drummond Hay and J. B. Coles' report owing to the indebtedness of the coolie and his constant victimisation by the *kangany*. Not even universal free passage to the estate, which would help enormously to popularise this country, has been adopted owing to this terrible bogey

of legislation which obsesses so many people concerned with Ceylon estates. During the last five years, when we have had in the Island a Governor so anxious to assist in the solution of the labour question, and a Colonial Secretary so thoroughly acquainted with it, the planters have thrown away an opportunity which will probably never occur again, and the fact that it was not seized will some day, we are afraid, be bitterly regretted. In trying to avoid one large imaginary danger planters and proprietors in Ceylon are running into a much more serious danger. No one pretends that the conditions of labour and pay that exist in Ceylon are such as would not afford grounds for very damaging attacks by people interested in stemming the tide of immigration into Ceylon from India. But this is a menace that apparently accounts for nothing as compared with the vague terrors which any form of legislation possesses for some people—terrors which are totally unaffected by the spectacle of our neighbours in the F. M. S. working hand-in-hand with their Government and in possession of a contended labour force totally free of the incubus which weighs so heavily on the coolie in Ceylon. An indication of the real dangers which beset the Ceylon labour force may be gleaned from a telegram which appears elsewhere. Not until our position is made sounder than it is in Ceylon can we afford to laugh at the calumnies which are uttered by enemies in Southern India."

The telegram referred to above reads as follows :—

"At the second day of the Tanjore District Conference at Pattukotai on Sunday, the 24th November 1912, Rao Bahadur K. S. Veukatarama Iyer (Negapatam) moved 'that this Conference urges on the Government to frame rules under the Indian Emigration Act XVII of 1908, providing that an intending emigrant should be required to produce before the protector or registering officer a certificate from the village magistrate to the effect that at the time of emigration there is no subsisting labour contract to which he is a party.' In doing so he said that in consequence of the enormous emigration of labourers out of the country there was a great drain and dearth of labour for agricultural operations. Recruiting agencies decoyed ignorant and credulous coolies, mostly by foul means, and oftentimes coercion and intimidation were employed by them to secure possession of coolies once captured by them even against their own will, when they desired to be rescued from their custody. False and exaggerated accounts of their wages and prospects in the Colonies were given to the credulous coolie by wily recruiters, and returned emigrants whom they kept for their own purposes were exhibited before him in the colour and glitter of their personal jewellery said to have been acquired with savings from their earnings. To reduce them in their nefarious methods of recruitment they were assisted by the collusion of police both of the railway and district, and by the railway staff and plague preventive staff of the Municipality stationed at Railway stations, the profits of the transaction being divisible amongst them. On being seconded by Mr. C. Sundram Iyer (Mayaveram) the resolution was put and carried. Dr. T. N. Nair, the President of the Conference, in concluding the proceedings said that when he travelled as a member of the Factory Commission this shortage of labour appealed to him in every factory that he visited, nearly every factory being deficient of its full complement of labour, the deficiency ranging from 15 to 25 per cent. They had heard appeals and exhortations addressed to them that day from that platform and at other times from other platforms for reviving their drooping industries, to start mills to establish manufactures, but supposing all this was done, supposing that they possessed the resources and genius for organisation, and energy and enterprise for it, had they sufficient labour in

the country to work their mills and factories? That was the question for them to face. They were so much dependent upon the Government for the removal of the evils they were suffering from that they turn to look for legislative remedies for this excessive emigration of labour to the detriment of their country's best interests. Their duty was to show that these coolies were enticed away under false pretences and placed beyond the reach of help or rescue. There was yet another side to that question, viewed from the humanitarian aspect. It had most revolting features to present. Women were kidnapped and used as prostitutes. The whole question of emigration wore an ugly aspect, and men and women, who were said to be recruited for emigration, required protection even it be against themselves."

Our Colombo contemporary naturally takes the side of its own Colony planting community and we do not blame it for so doing. At the same time we think it rather hard on the other side to be told that they are uttering calumnies and are enemies. Surely Southern India has the first call on its labourers, and if it is depleted, to its loss, of its best class of agriculturists and workmen, we think the members of the Tanjore District Conference were fully justified in their action. We have all along consistently pointed out that the drain of labourers to the Colonies from Southern India is inimical to the best interests of the Madras Presidency. The above telegram only confirms our statement. Why Assam planters should not have the preference to the British colonies is one of those paradoxes which puzzle us. Why the Southern India planting community object to Assam recruiting when the planters of that Province would only take a small proportion compared with those who are yearly taken to the Colonies is what surprises us. Surely Assam, which is part and parcel of India itself, should have the preference, if preference is to be. We pointed out the danger to Southern India long ago and asked it to "wake up." It appears to be doing so now, not a day too soon.—*Indian Planter's Gazette and Sporting News.*

LABOUR PROSPECTS.

The most plausible argument against the future output of plantations is that of shortage of labour. It is true that most plantations are at times short of labour, but I think this must generally be attributed to the manager's desire to keep down expenses. Out of a total of 227,985 coolies employed on Malayan plantations 126,665 or rather more than half, were imported from India. The average period of service on the plantation does not exceed two years—although many of these return after a holiday in their native land, and the difficulty is to engage during the recruiting season the exact number that are required to make good the probable departures during the rest of the year, without becoming burdened at the beginning with labour for which there is not profitable employment.

Within two years the plantation labour force has more than doubled. I do not believe that by increasing the rate of wages any great stimulus would be given to Indian emigration. Tamil coolies are more easily recruited for some plantations at half the wages paid on others which are unpopular, owing to unhealthiness or to some other cause; and this fact is becoming more clearly marked, since those employed at the lowest rates have found themselves able to remit more than half their earnings to India, and that their savings in three or four years are sufficient to establish them as capitalists when they return to their native villages.—*Rubber World.*

RUBBER.

Thinning-out Hevea Estates.

VIEWS FROM SUMATRA.

It is not very easy to lay down any hard and fast rule as to number of trees to aim at for the final number per acre, but in my opinion on absolutely flat ground it should not be more than 75 to 80 per acre, while on undulating and hilly ground it may be round 100 per acre. This applies more especially to our rich soils here, where growth is big and fast,

There are two reasons for not planting too close :—

(1) The soil will not nourish the trees and the root systems have not sufficient room.

(2) The branches get interlocked, shutting out light and air. The lower branches quickly die (giving entrances for disease,) and the tree, instead of having a large head with many leaves, grows long and lanky, with much wood and little foliage.

How far No. 2 affects the bark renewal no one can say with certainty, but that it does there is no doubt in my mind, after seeing the good results pruning has had here and there in this country. No. 1 can perhaps be by manuring; No. 2 to a certain extent by pruning; but in the long run both Nos. 1 and 2 must be treated by thinning out.

From observation here on 8 and 8 years old trees, 24 ft. by 24 ft. would seem a good distance, and this would probably be quite far enough apart for many years to come. After the trees have safely reached this age, there should be no great loss annually, if properly looked after. The diseases which we know at present will have in all probability quite disappeared, and jungle roots and timber gone also.

But 24 ft. by 24 ft., or 75 trees per acre, seems rather a waste of space in the earlier years when tapping has already commenced, and the tops of the trees are not yet very big. Therefore I should be inclined to plant my rubber trees 24 ft. by 12 ft., equal to about 151 trees per acre. This will allow plenty of light and air up to say the $6\frac{1}{2}$ to $7\frac{1}{2}$ year, will give us a large margin for losses between the $2\frac{1}{2}$ year and the $7\frac{1}{2}$ year, and when it is necessary to cut out by cutting out trees as necessary, and as time goes on in the 12 ft. rows, will give us a fairly regular plantation.

Planted 24 ft. by 12 ft. up to $2\frac{1}{2}$ years old, it should be quite feasible to replace dead trees, as on two sides such a tree will always get light and air, and will not be overshadowed, as should be the case if all were planted 12 ft. by 12 ft.

After $2\frac{1}{2}$ years it is not worth replacing trees.

This leaves us 75 trees to die out, or be thinned out if necessary, per acre. An ample allowance, as after 3 to $3\frac{1}{2}$ years the percentage dying out on good soil and a well run estate should be very low. As the trees come to 8 and 9 years old, it will be seen whether it is necessary to thin to as low as 75 trees per acre (24 ft. by 24 ft.)

Now as to the best method of thinning out, this would entirely depend on the state of the plantation. If the trees were very regular both in growth and planting it would be best to take out alternate trees, but if very irregular in growth and planting, as so many of the old coffee estate rubber trees are, then backward trees only should be taken out. One sees hundreds of

trees that can never come to anything, supplies put in long after they had a chance to get any light, etc.

It is of course better to keep one's plantation as regular as possible, but good trees should never be sacrificed to this. Four trees close together with *plenty* of room round them, will grow quite as well as four trees spread apart over the same amount of ground.

As regards immediate removal of trees to be thinned out, or first extracting all possible latex. This will depend on a number of circumstances. Where an estate is hard up, it would probably pay to tap and tar the trees at 6 or 8 feet, and continue tapping. These trees will not die, but will send out long suckers seeking the light. These suckers will not greatly interfere for some time with the trees left standing. I do not advise pollarding, but cutting off at 6 to 8 feet. These trees can be heavily tapped as soon as shoots begin to show, and would prove most useful for teaching coolies to tap, and for inferior coolies. During the time these topped trees are being tapped (say one year) over all available bark, and as low down to the roots as possible (the heaviest yield is there) the remaining trees will be improving their crowns, and after the year is out will be giving an increased flow, while on most estates young trees will be coming in. Thus the rubber crop should not fall off very greatly.

Of course a number of trees can be taken out root and branch immediately, as being too small for tapping. Later all these tapped trees must be entirely removed with their roots and destroyed.

I see no particular reason to fear disease in connection with thinning out, provided it is recognised that it will be an expensive job and must be done thoroughly, and too much is not taken in hand at once. Complete destruction of all dead wood is of course essential. Roots will give the most trouble.

Finally, the whole question is one more for common sense and individual decision and care, than for any hard and fast rule. Different soils, elevations, etc., etc., will all play a part. The most difficult thing is for any planter to sufficiently harden his heart to start the necessary and often drastic treatment required.

All the above of course applies where there is no catch crop. I hope the above opinions may be of some use.

Yours truly,

J. VERSCHOYLE CAMPBELL,

—*The India Rubber Journal.*

SISAL HEMP.

In connection with the Sisal Hemp industry of the East Africa Protectorate (this *Bulletin*, 1911, 9, 71, 306; 1912, 10, 522), an association has been formed, representing planters, merchants, and others, and termed. "The British East Africa Fibre Association." The principal objects of the Association are to study and give advice on methods of producing, standardising and grading fibre, to report on the fluctuations of the market and the prices realised, to keep its members informed of matters connected with fibre-growing in various parts of the world to give advice with regard to machinery, to negotiate for the reduction of freights, and to endeavour in various ways to secure the best possible returns for planters. Further particulars of the Association are given in the *Agric. Journ., Brit. East Africa* (1912, 4, 103).—*Bulletin of the Imperial Institute.*

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Scientific Officer's Papers.

CXH1.—THE PEST ACT IN ENGLAND.

In Sc. O. Paper No. 109 (Vol. VIII. p 567) when discussing the prevention of the introduction of insect pests and fungoid diseases of plants it was mentioned that in England the Board of Agriculture issued orders making pruning of Gooseberry bushes attacked by disease compulsory and also enforced compulsory spraying of fruit trees to deal with the American mildew.

A recent issue of the *Gardeners' Chronicle* contained the orders issued by the Board of Agriculture in England, from which it appears that under the Destructive Insects and Pests Order of 1910, sixteen pests are scheduled, and there are in addition three other special orders. The following digest of these may prove of interest :—

(A) The Order of 1910 states :—

The occupier of any premises on which an insect or pest mentioned in the schedule to this Order exists, shall forthwith notify the fact, with particulars of the time and place of discovery, to the officer appointed by the Local Authority to receive such notices, or, if no such Officer has been appointed, to the Board ; and, where practicable, a specimen of the insect or pest shall accompany the notice.

An Inspector or other officer appointed in that behalf by the Local Authority and any Inspector of the Board may, upon production if so required of his appointment, or authority, enter any premises on which he has reason to believe that an insect or pest mentioned in the schedule to this order exists, or has recently existed, and examine any plant, fruit, crop, seeds, tubers, bulbs, layers, or cuttings, on such premises.

Every person, who shall knowingly use, or sell for use, for planting any plant, seed, tuber, bulb, layer or cutting attacked by an insect or pest mentioned in the schedule to this Order, or any seed, tuber, bulb, layer or cutting which has been derived from a plant so attacked and is capable of spreading the insect or pest, shall be liable on conviction to a penalty not exceeding £10.

It shall not be lawful, except with the written permission of the Board, to import, sell, or offer for sale a living specimen of any insect or pest mentioned in the schedule to this Order.

(B) The Order of 1911 specifies as follows :—

The occupier of any premises on which there is a bush ("Bush" is defined as a Gooseberry bush or Currant bush, and includes a cutting, stock, or seedling, and any part of a bush except the fruit.) which is, or appears to be, diseased, shall, forthwith, notify the fact by post or otherwise to the Board or to the clerk to the Local Authority, or to an Inspector of the Board or of the Local Authority, and where practicable a specimen showing the disease shall accompany the notice.

This Order further requires that no bush shall be moved from any garden in which disease exists or appears to exist until after an investigation by the Local Authority, who may at any time and from time to time, by a notice served on an occupier of infected premises require him to adopt such measures for prevention of the spread of the disease as are also authorised by the article and specified in the notice.

The landing in Great Britain of any bush brought from any place out of Great Britain (except the Channel Islands) is prohibited, except that this provision does not apply to the landing of any Currant bush under the authority of a license authorising such landing previously obtained from the Board of Agriculture and Fisheries.

(C.) The Wart Disease of Potatos Order of 1912 provides in the same way as the other two for notification of the existence of the disease, and orders that no tubers shall be removed from any premises on which the disease exists or appears to exist until after investigation by the Local Authorities, who are empowered to prohibit the planting of Potatos in the infected premises, except under prescribed conditions. It is further provided that :—

It shall not be lawful to use any diseased tubers for planting, or to sell or offer for sale diseased tubers for that purpose, and an Inspector of the Local Authority acting under their directions may, by a notice served on the occupier of any infected premises, prohibit the removal of any tubers from the infected premises, except under such conditions as the Inspector acting under such directions may consider necessary to prevent any diseased tubers being so used or sold or otherwise disposed of for planting.

(D) The American Gooseberry-mildew (Fruit) Order of 1912 prohibits the sale or exposure for sale of diseased Gooseberries, and further prohibits the importation of Gooseberries from any place outside Great Britain (except the Channel Islands), except when the package is labelled "Imported Gooseberries," and bears the name of the consignor and the country and district of origin. Cleansing of packages which have contained diseased Gooseberries is also provided for.

The Destructive Insects and Pests Acts under which the Board of Agriculture and Fisheries can take action in this way was passed by Parliament in 1907 and was an extension of an Act of 1877 passed to deal with the Colorado Beetle, a great scourge of Potatos in America, which it was felt was a menace to the English crop if it once became established. Its eradication was successfully accomplished by help of this Act by the Agricultural Department of the Privy Council, now the Board of Agriculture and Fisheries.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**Kanan Devan Planters' Association.**

Proceedings of an Extraordinary General Meeting of the K. D. P. Association held in the High Range Club, Munnar, on Saturday, 23rd November, 1912.

PRESENT.—C. Fraser, Esq. (*in the Chair*). Messrs. D. Mackintosh, G. E. Bewley, A. H. Dixon, W. L. Ranking. Dr. J. S. Nicolson, M.D. Messrs. H. S. Smith, M. C. Koechlin, J. C. Swayne, A. J. Wright, W. A. Lee, A. W. John, G. W. Cole, S. H. Paulet, J. H. Jeffrey, J. A. Gwynne, A. G. Murray, A. Yates, J. M. Bridgman, B. T. Landale, H. L. Pinches, W. J. Dixon, A. W. L. Vernede, W. Fraser, E. A. Hughes. (Honorary Secretary).

Messrs. John Carless and C. Rowson, by their Proxy Mr E. A. Hughes.

The notice calling the Meeting having been read, it was proposed by the Chair :—“ That the Minutes of the last Annual General Meeting having been printed and circulated be taken as read and confirmed.” This was carried *nem con.*

The following agenda was laid on the table :—

- (1) To vote for the additional Planting Member for the Legislative Council of the Government of Madras,
- (2) To elect the Delegate for the Sri Mulam Popular Assembly,
- (3) To consider the Finance Committee's redrafted rules of the S. I. P. B. Fund,
- (4) To consider the proposed Registration Scheme for labour,
- (5) Correspondence.

The Honorary Secretary having read the rules with regard to the voting for a Planting Member, voting papers were distributed and ballot carried out in due form, with the following result :—

For Mr. E. F. Barber 23, for Mr. J. A. Richardson 4, total 27.

The Honorary Secretary was asked to inform the Secretary of the U. P. A. S. I. in due course of the result.

The Chairman in a few well chosen words proposed : That Mr. A. J. Wright be again elected to attend the Sri Mulam Popular Assembly as the K. D. P. A. Delegate.” This was carried *nem con.* The Chairman then said that as this was the first occasion on which they had met since the last Sri Mulam, he would ask the Meeting to pass a hearty vote of thanks for the good work Mr. Wright had done as Delegate and for the trouble he had taken in forwarding their interests. This was carried unanimously. Mr. Wright thanked the Meeting very heartily for the honour they had done him in re-electing him as Delegate and also for the vote of thanks for the work he had done. He said it was a great pleasure to be able to help the Association and assured them that at the coming Assembly he would do his utmost to forward their interests in every possible way.

On introducing the 3rd item in the agenda, the Chairman remarked that there was a good deal of correspondence with reference to the matter. He was certain himself and felt sure that Meeting would agree that the administration of the S. I. P. B. Fund was at present in safe and capable hands. The Finance Committee was a thoroughly reliable and business one and the Fund interests would be administered by them to the best possible advantage. As they were pressed for time he would ask the Meeting to allow the Honorary Secretary, who was one of the Finance Committee, to

explain the proposed alterations as shortly as possible without reading the whole correspondence on the subject. Mr. Hughes then explained the proposed alterations which were unanimously approved, and was asked to write to the Secretary of the U. P. A. S. I. to this effect.

With regard to the proposed Registration Scheme, the Chairman said that every one present had received a copy and had ample time to consider it fully. He was sure all agreed that any scheme to put labour conditions on a better footing was most desirable and deserving of their utmost support, but any attempt at compulsion or restraint with regard to labour, beyond a certain point, was a move in the wrong direction. They had received the following letter criticising the Scheme from Mr. Martin, which he would ask the Honorary Secretary to read to them.

Mr. Hughes then read Mr. Martin's letter as follows:—

"My dear Hughes, *Scheme of Registration*.—I return the printed leaf you gave me. I consider the Scheme unworkable and inadvisable. I shall leave its unworkableness to be explained by others, for I am quite sure this will be done in many quarters and I shall confine myself more or less to its inadvisability. No scheme, not even this one, can stop emigration. We admit, at least I do, that coolies like every one else, have a right to work in any part of the world where they can make the best living. This Scheme would certainly annoy emigrants to some extent at first, but as soon as it was found that as second-class or even first-class passengers to the Straits or elsewhere, they would be free from the annoyance, they would emigrate just the same. Rupees 20 per head would not be a deterrent to estates that must have labour, for this would only have to be paid for defaulters whose finger prints were registered in India and not on the vast bulk of cooly emigrants. Are you going to examine the fingers of every first-class passenger simply because his skin is black or because he smells a bit? I am inclined to think that in the end, this Scheme would encourage emigration, for, were I a cooly, I should prefer to emigrate rather than submit to the troubles of registration, after I had cleared myself from my first experience of it. The Scheme might enable a Registerer to catch persons whose finger prints are registered—true, but having caught them, what can be done with them? The coolies have only to go to the nearest Magistrate and say they do not wish to work with Mr. Registerer, and claim the protection of the Court. What then? Are we to return to the days of slavery and the lash? Again, how many planters, after, say a year's working, are going to take the trouble of returning paid-off coolies' imprints? Even if a very few neglect to do this, to what confusion will it not lead. Once more, who is going to pay the cost of feeding coolies while experts make up their minds how many of the gang are, and how many are not registered, and while correspondence is passing? If I can't go to Ceylon from Mangalore, what is to prevent my going to Thondi and shipping from there by native craft without going before any Emigration or Government Officer, or asking leave of any one at all.

"Let us for a moment suppose that all difficulties have been overcome and the Scheme is put in force. Can Government justly refuse the same rights to Indian planters of rice and other products? They suffer in the same way as European planters and why should their registered coolies be allowed to emigrate from British India to Travancore or Mysore? Our last state would indeed be worse than our first. On more general grounds, the Scheme is inadvisable being in the nature of Class Legislation, and conceived in the interests of one class of the community. It would be a retrograde step, in that it differs from the only sound principle, which is to give coolies such pay and treatment as will induce them to work for us. In these days it is insufficient merely to offer a good article; the article

itself must be advertised. We must let it known far and wide what we offer coolies and point out the disadvantages of countries trying to induce coolies to emigrate. A friend of mine had as co-passengers on boardship a few years ago, a goodly gang of coolies going to Natal; he asked them why they did not work for us instead of emigrating and their reply was that they had never heard that coolies were wanted by us. That was my fault, and not the fault of the coolies. If the Scheme was compulsory, I can only repeat what I have said before, that it would amount to a dragooning of the agricultural population to which it is to be hoped no Government would agree, and to which no freeman should submit, while if not compulsory, it will certainly prove unworkable. Our district has its troubles in getting sufficient labour, and sometimes in keeping it. I feel so sure that the Scheme under consideration would add to them, instead of alleviating them, that I would refuse to join in it. In conclusion, I would like to express my admiration of the ingenuity displayed in an attempt to meet every point that could arise under such a scheme where it at work, and my thankfulness to the authors of it for having spared the time, and taken so much trouble on behalf of all of us, to arrive at some method of helping us in the most difficult of all problems which face the community, a difficulty which is bound to increase every day. In something much simpler than this scheme the solution will be found.

Yours sincerely,

(Signed) A. Ff. MARTIN."

The Chairman then proposed that the Meeting go into Committee to discuss the matter. A considerable amount of discussion took place and the Scheme was gone into very thoroughly. Its advantages and disadvantages being carefully considered. On return to open Meeting, the following Resolution was proposed by the Chair :--

"That this Association while considering that any scheme to prevent the enticement and emigration of advanced labour, is both advisable and necessary, considers the present scheme unworkable and inadvisable, but will heartily support any proposal more feasible and effective." This was carried unanimously.

The Honorary Secretary then read a letter from the C. T. P. A., Peer-made, dated the 12th November, containing that Association's Resolution:—

"That the Honorary Secretary do write to all other Planters' Associations in Travancore and ask them for their support in asking the Travancore Government to legislate with regard to labour in Travancore only."

The Chairman said that any attempt to ask for Government interference with regard to labour was a very serious matter and wanted the most careful and cautious consideration, and he hoped all Members would give the matter their most careful attention before coming to any decision. After considerable discussion, it was proposed by Mr. Pinches and seconded by Mr. Wright "That this Association do not consider it advisable to ask Government for legislation with regard to the Estate labour in Travancore." This was carried unanimously.

Read a letter from the Honorary Secretary of the same Association with regard to the rate of subscription to U. P. A. S. I. by affiliated Associations. It was proposed by the Chair "That this Association while recognising the advantage of all other Associations paying on a 2 anna basis did not consider it advisable to endeavour to enforce this." They hoped, however, that all other Associations would eventually come in at this rate. Carried unanimously.

Read letter from the Government Planting Expert, saying that he would visit the District sometime during the months of January, February, or March. The Honorary Secretary was asked to write to Mr. Anstead and inform

him that the members would be very pleased to see him at any time during these months he found most suitable.

The Honorary Secretary then said he regretted that, so far, response to his circu'ar asking for subscriptions to the S. I. P. B. Fund had been very poor. He pointed out that the Fund was a most deserving one and a list was then circulated. The following subscriptions, in addition to those already paid, were promised :—

			Rs.	A.
J. A. Gwynne, Esq.	...	...	10	0
A. Yates, Esq.	...	...	10	0
A. W. John, Esq.	...	...	10	0
W. L. Ranking, Esq.	...	..	10	0
H. S. Smith, Esq.	...	...	5	0
A. H. Dixon, Esq.	...	...	10	0
W. Fraser, Esq.	...	...	10	0
L. H. Ley, Esq.	...	...	5	0
J. B. Ingram, Esq.	...	...	10	0
D. Mackintosh, Esq.	...	...	5	0
W. A. Lee, Esq.	...	...	10	0
S. H. Paulet, Esq.	...	...	7	8
A. J. Wright, Fsq.	...	...	10	0

TOTALS Rs.112 8

A vote of thanks to the Chair terminated the Proceedings.

ERNEST A. HUGHES,

Honorary Secretary, K.D.P.A.

LETCHMI ESTATE, 3rd December, 1912,

Malabar Coast Planters' Association

Proceedings of an Extraordinary General Meeting held in the Trichur Club, on 30th November, 1912.

PRESENT.—Messrs. A. H. Mead (in the Chair), Campbell Hunt, C. W. Clode, R. de Roos Norman, H. Waddington, H. C. Plowden (Honorary Secretary).

Notice calling the meeting having been read the minutes of the last Meeting were taken as read.

Planting Member.—The meeting proceeded to vote in accordance with the rules published in the *Planters' Chronicle* of November 2nd, Mr. E. F. Barber's candidature was supported unanimously.

Resolved: "That this Association considers that Mr. Guy Owen should succeed Mr. Sanderson in the London Chamber of Commerce."

Labour Registration Scheme.—Resolved: "That the Honorary Secretary do write to the Secretary of the U. P. A. S. I. informing him that this Association considers the scheme unworkable as regards the labour in our districts."

A vote of thanks to Mr. E. Lord having been passed thanking him for his services as Chairman of this Association, it was resolved: "That Mr. Plowden carry on the Association as Chairman and Honorary Secretary." Mr. Mead agreed to draw a scheme for a District Association with branches and to submit that same to members in Malabar, Cochin and Travancore with a view to altering the constitution of this Association at the next General Meeting to be held in January.

The Proceedings closed with a vote of thanks to the Honorary Secretary of the Trichur Club thanking him for the use of the room.

(Signed) A. H. MEAD, *Chairman.*

(") H. C. PLOWDEN, *Hony, Secy.*

THE PLANTERS' LIBRARY.**The Journal of the Madras Agricultural Students' Union.**

We have been favoured with a copy of the first number of this new Quarterly Journal of Agriculture which is to be the organ of the Union which is composed chiefly of the past students of the late College of Agriculture at Saidapet and of the new Coimbatore College and of present students of the latter Institution. The Saidapet College was closed after 30 years' work on account of the soil on the Farm being unsuited for experimental work and the work begun there is now being continued at Coimbatore.

To quote from the Preface, "this Journal is primarily meant to draw the old and the new students into closer bonds of fellowship with a view to turn out some useful work. Prominence will, therefore, be given in the Journal to the publication of what may be called 'College News.' Old students will be made acquainted with information that may interest them with reference to what is taking place in the College. Notes summarising the work of the experimental stations will be an important feature of the Journal. It is proposed that the subjects treated of should, as far as possible, have a practical aspect and with this object old students and other correspondents will be requested to send contributions stating practical experiences and personal difficulties omitting all subjects which may have the least political tinge in them. It is hoped that the Journal will supply a real need not only for the old students of the College but as well for others who may be interested in the progress of the agricultural condition of the country, as for instance, the enlightened Zamindars, landlords, and members of agricultural associations of the Presidency, and those who wish to be in touch with what is being done by the new Département of Agriculture for the welfare of India."

Of the 63 pages of this first issue the majority are taken up with accounts of the College Day Celebration and the Agricultural Conference and so are of more interest to the College students than to the general public. There are, however, several scientific articles; the first by S. L. D'Silva dealing with the subject of the diseases and injuries of the horns of cattle and dehorning. The second article is by Dr. Mann, the Principal of the Agricultural College at Poona, on 'Local Bodies as Agents in Agricultural Improvements.'

The third scientific article is a summary of a lecture delivered by Dr. Barber at the Agricultural Conference at Coimbatore last year, on "Sugar-cane Seedlings in India." Dr. Barber has recently been appointed Government Sugarcane Expert and is to study the development of new seedling canes for India. The usual method of propagating sugarcane is a vegetative one, namely by cuttings, but if new varieties are to be obtained these must be got by crossing different kinds of canes and obtaining seed from them. These lines have been adopted with considerable success in Java and by the Imperial Department of Agriculture in the West Indies. As Dr. Barber points out "it is hardly necessary to emphasise the fact that the cane industry in India is in a very unsatisfactory condition. Although the greatest sugar producer in the world none is exported, such good canes as are present are grown on a very small scale or are heavily diseased and the vast majority of the cane growing tracts have, perhaps, the worst canes in the world to rely on. The raising of seedling canes in India seems, therefore to be a very necessary proceeding."

As will be seen from these few extracts this new Journal promises to be an interesting one and we wish the authors every success in their enterprise.

COFFEE.

Robusta Coffee.

Of the several species of *Coffea* discovered within recent years in tropical Africa, notably in the Belgian Congo, the most important from the practical point of view is that commonly known as *Coffea robusta*, yielding "Robusta" coffee. This plant was found to offer considerable advantages over other coffees, especially in its quick and robust growth, its early bearing and heavy yield, and its comparative freedom from the attacks of leaf-disease fungus. Robusta coffee has, therefore, for some time past received considerable attention at the hands of planters in different parts of the tropics, particularly in Java, where its cultivation may now be said to have passed the experimental stage. Enquiries received at the Imperial Institute show that the published accounts of Robusta coffee are not readily accessible to planters interested in the new crop, and it has therefore been thought desirable to bring together the more important features of the experience gained with regard to the cultivation of the plant and the preparation of the finished product.

At the outset it may be stated that the somewhat extravagant hopes at first entertained of Robusta coffee, more especially in relation to its resistance to disease and to the quality of the product, do not at the present time appear likely to be entirely realised.

The valuable papers of Messrs. Cramer, Gallagher, and Labroy have been laid under special contribution in the compilation of this article.

HISTORY AND NOMENCLATURE.—The difficulties met with in the botanical nomenclature of Robusta coffee are in large measure bound up with the history of the plant. According to Dr. Cramer, the plant was first put on the market by a Belgian firm, who had obtained supplies from their representative, M. Luja, by whom the plant had been discovered in the Congo. The new coffee was described as *C. robusta* on account of its vigorous growth, but its close relationship to *C. Laurentii* De Wild., and *C. canephora* Pierre, and its varieties, was early recognised, and from these two species it was distinguished with difficulty. Cramer from a study of living material of "*C. robusta*" and *C. Laurentii*, concludes that the two plants are identical, in which case "*C. robusta*" is more correctly described as *C. Laurentii* De Wild., a species discovered in 1898 by Emile Laurent in the Belgian Congo. The question, however, cannot yet be regarded as finally settled.

Supplies of Robusta coffee plants were first sent to the East in 1900, in which year young plants, in Wardian cases, were despatched to Java. By the beginning of 1901 the coffee had been planted on several estates in Eastern and Central Java with promising results.

CHARACTERS OF THE PLANT.—In certain vegetative characters, *C. robusta* would seem to occupy the same relative position with regard to *C. liberica*, as does that species to *C. arabica*. Robusta coffee grows more rapidly than Liberian, a plant eight months old being much taller and possessing more branches and leaves than Liberian coffee twelve months old. The plant is of a more robust habit, and the leaves, though variable in size, are larger than those of *C. liberica*, but thinner and of a lighter green colour. The branches, however, have a tendency to bend downwards, so that the bush becomes somewhat umbrella-shaped. Like *C. liberica* the plant flowers throughout the year, flowers being intermediate in size between

those of the species named and of *C. arabica*. Perhaps the most striking feature of Robusta coffee is the large number of berries borne in the numerous thick clusters, each of which contains on an average 40 to 60 berries, though larger numbers are frequently met with. The berries are much smaller than in Liberian coffee, but, since the pulp is thinner, the beans are markedly different in point of size from those of *C. arabica*. Gallagher states that on an average 10 cwt. of Liberian berries give one cwt. of marketable coffee, while only 4 cwt. of Robusta berries are required to yield the same amount. In the case of the latter coffee, many more berries go to the cwt. than is the case with Liberian coffee, but the greater number on the branches renders the picking "if anything, cheaper." The red pulp is easily removed, as is also the thin parchment.

QUALITY OF THE COFFEE.—Considerable variation is to be found in the opinions expressed as to the quality of Robusta coffee, but it is not improbable that such differences are in some measure to be explained as a result of different methods of preparation, not all of equal excellence. It is stated that the beans do not possess a first-class colour, and that for the first two crops a good aroma is lacking. De Wildeman affirms that the flavour recalls that of Liberian coffee, but with less aroma. Hart compared Robusta coffee with the coffees of Costa Rica and the East Indies; while, according to Cramer, the quality of well-prepared Robusta coffee is approximately that of middling Arabian coffee. The beans possess a bluish-green colour, similar to that of the Arabian product, but they are of a somewhat different shape, being larger and more convex on the curved side.

In preparing Robusta coffee for consumption it is necessary that the beans should be well roasted, and it is stated that the coffee loses less weight during this process than is the case with other kinds.

MARKET VALUE.—A fair amount of Java Robusta coffee has been offered on the London Market, where it ranks with Brazilian coffee and meets with a ready sale, the value in May 1912 being 73s. to 75s. per cwt. for "ordinary to well-picked parcels." At that time supplies were reported to be scarce and enquiries for the coffee were being received by brokers.

THE PLANTING INDUSTRY.—At the present time the planting of *C. robusta* on a commercial scale is practically confined to the Dutch East Indies, notably Java. As stated above, the first consignment of the plants reached Java in 1900, and since that time the area under this crop has rapidly increased, particularly in the eastern and central districts of the island. Within two years of its introduction, the species was regarded as worth the serious attention of planters, and, by 1905, the area planted was restricted only by the limited supply of seed at that time available. In 1909 a conservative estimate placed the area under Robusta coffee at about 30,000 acres, and since then further rapid strides have been made. As an indication of the popularity of the crop in Java, it may be mentioned that in 1908-9 the area planted in the Malang district was approximately 12,000 acres, with no more than 60 acres under *C. liberica*, while *C. arabica* had been abandoned.

Two systems of cultivation have been adopted in Java with regard to Robusta coffee. Attention has hitherto been devoted chiefly to growing the coffee as an intercalary or catch-crop with Para rubber, for which purpose the crop seems in certain particulars to be well adapted. The coffee has also been recommended as a satisfactory catch-crop for coconut plantations. Planters, however, are now growing Robusta coffee itself as a

main or permanent crop with good results. It may be mentioned that the industry has been greatly helped by the Government, who have established nurseries and arranged for the free distribution of young plants to natives.

Experimental cultivations of Robusta coffee have been made in several parts of the tropics, but up to the present time no considerable plantations have been laid down other than those in the Dutch East Indies. The plant has been successfully grown in Trinidad, Dominica, the Gold Coast the Philippines, the Federated Malay States, and elsewhere, but no progress has been made. The most probable explanation of this state of affairs is the comparative lack of interest in coffee displayed by planters as a result of the dominance of Brazil as a coffee-growing country. Samples of Robusta coffee grown in the Gold Coast may be seen in the Gold Coast Court in the Public Exhibition Galleries of the Imperial Institute.

Cultivation.

Experience with Robusta coffee as a plantation crop has been gained chiefly in Java, and the following notes on the cultivation of the plant are based on published accounts of the work done in that country.

CLIMATE.—In selecting a site for the plantation particular attention should be directed to secure adequate protection from the wind since the plant will not flourish in exposed situations. Natural wind-breaks will of course be utilised, if available, but in their absence it will be necessary to provide protection by planting trees for this purpose. Experience in Java has shown that the plant flourishes at all altitudes between sea-level and 3,000 feet, especially favourable results being obtained at Malang at an altitude of 1,000 feet. The finest plantations occur in the humid districts of Eastern Java, where the heavy rainfall is equally distributed throughout the year. While preferring an abundant and regular rainfall, *C. robusta* appears to be capable of withstanding a certain degree of drought, as instanced by experience in certain districts in the south of Java, where the plant has been known to survive a dry season of nearly four months, quickly recovering after the onset of rains.

SOIL.—The root-system of *C. robusta* is well developed and of rapid growth, and in young plants the roots are found largely to occupy the top soil. As would be expected under such circumstances, compact, heavy, or clayey lands are unsuited for the crop, which thrives best in a deep, light, sandy loam rich in humus. Peaty lands, especially when deep and badly drained, are unsatisfactory, but can be improved by good drainage and liberal applications of lime. Gallagher asserts that practically all the inland plantations in the Federated Malay States possess soils which are admirably adapted to this coffee.

SHADE.—In Java the crop is always grown under shade, but the planter considers this question from different standpoints according as the coffee is grown as a main crop or as an intercalary or catch-crop with cocoanuts or Pará rubber. In the latter circumstances the rubber or cocoanuts will afford the shade necessary, but in the former case special shade trees must be provided. Leguminous trees are especially valuable for this purpose and in Java *Caesalpinia* (*Peltophorum*) *dasyrachis* and *Deguelia* (*Derris*) *microphylla* have been particularly successful; formerly, Para rubber was advised for the same purpose, but Cramer states that in large, pure plantations of coffee, the shade afforded by isolated trees of this species is unsatisfactory, not only on account of its comparative lightness but also as a result of its absence during the dry season,

Nurseries.—On certain plantations in the East all the Robusta coffee has been raised from seed at stake. The trees appear to be successful, but the general consensus of opinion is that the best results can only be obtained by first raising young plants in a nursery and then setting them out in the plantation. It is stated that *C. robusta* is very readily transplanted. The preparation of the nursery beds is a matter of considerable importance. The soil should be very carefully prepared and reduced to a fine tilth, and, at a height of about six feet, provided with a deep shade that can be gradually reduced as the young plants become older, in order to inure them to the sun before being planted out. Cramer recommends that a "germinating bed" should be established, in which the seeds (the finest procurable) should be sown thickly with a view to transferring the best of the seedlings, as soon as they can be shifted, to the nursery, where they are planted at a distance of about 12 inches apart. When about nine months old, the young plants are ready to be stumped previous to setting out in the plantation. If the seeds are planted direct in the nursery, they should be set about 6 in. apart and the plants transferred to the plantation when they possess four or five leaves.

PLANTING-OUT.—When seedlings are employed, the usual procedure should be followed, the plants being set out with a ball of earth adhering to the roots. In the case of stumps this is unnecessary, the tap-root being cut back before the young plant is put out. The distance between the plants varies with the circumstances of the plantation, but is somewhat less than that usually adopted for Liberian coffee. When planted as a permanent crop, experience in Java shows that satisfactory distances vary from 7 feet by 8 feet to 10 feet by 10 feet, the plants being arranged quincuncially, *i.e.*, with an additional plant at the centre of each square formed. Gallagher, however, states that in the Federated Malay States the best distance is 12 feet by 12 feet, with a further plant in quincunx. When the coffee is to be interplanted with Pará rubber, the distances will naturally depend upon those of the main crop. The catch-crop should be arranged in rows between the rubber trees and as a working basis it may be taken that 5 feet should be the minimum distance between the coffee plants, and 7 feet the minimum distance between the coffee and rubber trees. Thus, in a plantation with rubber set out at 30 feet by 15 feet, four rows of coffee can be planted in the wider avenues, giving about 960 plants per acre.

CARE OF THE PLANTATION.—Experience has shown that the cost of maintenance of a Robusta coffee plantation is less expensive than when other varieties of coffee are concerned. Epiphytes do not grow on the trees, and when the latter are fully established, the ground is sufficiently shaded to prevent weeds obtaining any great luxuriance. Gallagher, however, points out the necessity of keeping the plantations perfectly free from weeds. He advises hand-weeding, since, if cutlasses or mechs are employed, the labourer is apt to wound the lower parts of the coffee stems, with the resulting formation of unnecessary branches. These latter should be removed as soon as they appear. It is stated that the effect of weeds gaining the upper hand in a plantation is a reduction of crop, even to the vanishing point; but the coffee will not be permanently affected if clearing is not unduly delayed, since the trees will recover their normal health in the course of a few months after satisfactory conditions have been restored. The soil should be forked over at the end of the second year, and the process repeated annually.—*Bulletin of the Imperial Institute.*

(To be continued.)

COOKING BY SOUND.

Coffee Roasted in Three Minutes.

The avowed object of the lectures and demonstrations in Common Sense Cookery in Health and Disease given at the Offices of the Society of Medical Officers of Health, Montague-Street, Russel-Square, is, in the words of Mr. William Lawton, the Demonstrator, "to turn things upside down with regard to cooking generally." Yesterday he gave a demonstration of cookery by sound, and to the satisfaction of his audience revolutionised the method of roasting coffee. When he offered to roast coffee in three minutes the coffee roasters doubted his veracity, for according to ordinary methods the time taken is from twenty-five to forty-five minutes. Mr. Lawton demonstrated for the first time with a perforated coffee roaster of his own invention. The idea is by turning the handle of the machine at a certain speed the beans are thrown into the air; the heat passes through, and the coffee is roasted in suspension. A quantity of ordinary Costa Rica coffee beans were placed in the roaster, and the handle was turned. By-and-by there was a cracking noise, an indication that the process of roasting was nearing completion. When the cracking sound became general, that was the signal that the beans were roasted exactly to the requirements of the amateurs of good coffee. The beans were roasted to the light brown colour to suit English tastes. By turning the handle half a minute longer a ticking noise was heard. A succession of ticks was a warning that the beans were roasted to a degree desired by Frenchmen, who prefer all the oil inside. It is claimed for this new method of roasting that the heat from the gas makes the roaster selfcleansing, for everything is burnt as the beans fly through the air. After the roasting process a number of the light brown beans were split. They were shown to be perfectly cooked. The demonstrator expressed his preference for a mixture of coffee roasted in the English and French fashions—two-thirds of the light brown beans and one-third of beans with the oil on the surface. It is popularly supposed that the beans should be ground as soon as roasted, but Mr. Lawton's theory is that the beans should be kept two days. The beans, after being roasted to light brown, are from 25 to 50 per cent. larger, and their size is increased 50 per cent. when roasted in the French style. If strong coffee is desired the latter beans with the oil on the surface are used. Beans roasted two days ago in a little over three minutes were ground, and four heaped dessert spoonsful were placed in a coffee pot, and a pinch of salt added. Three pints of water were boiled and poured over the coffee. To this was added a little cold water. The coffee was now ready for serving, and cups of it were handed round. There was no doubt about its fine flavour. Its taste was voted excellent by several members of the audience, who wanted to know how much the coffee would cost per pound. The answer was a shilling.—*Morning Post*.

GUATEMALA.

The August number of the *Bulletin* of the Pan-American Union states that the production of coffee in Guatemala in 1911 amounted, in round figures, to 712,500 quintals (about 645,00 cwts.). At the close of that year there were 2,156 coffee plantations in the country, comprising an area of 880,320 acres planted with 68,161,626 coffee trees.—*Board of Trade Journal*.

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